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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 36.] 1939. [No. 5.

SUMMARY OF RECENT ABSTRACTS.*

IV. TRYPANOSOMIASIS.

Epidemiology.

The extent to which trypanosomiasis is prevalent in West Africa is shown by the fact that in Nigeria the total number of cases diagnosed from 1931–36 was 264,933 (MACQUEEN, p. 697) and in North Dahomey during the period 1932–36 the new cases found numbered 7,702 (BEAUTÈS, p. 707).

Aetiology.

SCHWETZ (p. 700) divides trypanosomes morphologically into three groups :—

1. *Congolense* : monomorphic with lateral blepharoplast.
2. *Vivax* : monomorphic with terminal or subterminal blepharoplast.
3. *Brucei* : polymorphic with subterminal or lateral blepharoplast.

The elaborations of these are given in the original abstract.

JACONO (p. 327) proposes the generic name *Castellanella* for trypanosomes of conventional type, reserving the name *Trypanosoma* for forms similar to those observed in the blood of frogs. This proposal is not accepted as valid by WENYON. CASTELLANI and JACONO (p. 327) publish details of a human case in support of this proposed classification.

HOARE and BROOM (p. 701) found that it is possible in practically all cases to differentiate *T. uniforme* and *T. vivax* by measuring the length of only 10 trypanosomes. If the mean length is less than 18μ the infection is *T. uniforme*, if more than 20μ it is *T. vivax*.

Working on the respiratory metabolism of *T. rhodesiense*, CHRISTOPHERS and FULTON (p. 709) found that the most striking feature was the utilization of glucose, the formation of acid products and the large oxygen uptake. Deprived of glucose, trypanosomes rapidly become motionless, deformed and lysed, and the uptake of

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1938, Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

oxygen ceases. *P. knowlesi*, on the other hand, takes up oxygen steadily in the absence of added glucose and independently of the normal presence of this in serum or red cells. Oxygen is taken from haemoglobin, which is altered if not actually split up ; there is no formation of acid. Certain drugs cause inhibition of the oxygen uptake by both trypanosomes and malaria parasites, and this may be related to the therapeutic effect. The oxygen uptake gives a continuous record of the lethal effect of a drug, and the experimental method used by the authors is rapid and precise, and provides a ready means of telling whether a strain is arsenic-fast. VON BRAND (p. 712) shows that the carbohydrate metabolism of the pathogenic trypanosomes is very intense, but the sugar is only partially oxidized in the presence of oxygen. The carbohydrate metabolism of the host is disturbed. Injury to the host may be due to loss of carbohydrate, or to the lactic acid formed by the trypanosomes, or to toxins perhaps originating from protein metabolism of the parasites.

CORSON (p. 333) found no evidence of lowering of virulence of a strain of *T. rhodesiense* maintained for nearly three years in ruminants and *G. morsitans*.

Sleeping sickness has become more virulent during the past 6 or 7 years in some localities in Nigeria where *G. morsitans* is not present and there is very little game (MACQUEEN, p. 698).

BOURGUIGNON (p. 328) found in the south-east of the Belgian Congo a patient infected with a trypanosome having the characters of *T. rhodesiense*. The strain in the guineapig was resistant to a dose of 1 gm. per kilo. of tryparsamide and cyclically transmissible in *G. palpalis*. The exaltation in virulence is probably due to the presence in that region of different species of Glossina able to transmit *T. gambiense*.

VAN HOOF *et al.* (p. 698), investigating the transmissibility by *G. palpalis* of strains of *T. gambiense* from the Congo, found that it varied from zero to 10·2, as calculated by the formula (q.v.). Differences were found in various endemic zones and the two factors capable of lowering transmissibility appeared to be long sojourn in one host and lengthy drug treatment in refractory cases. Natural resistance of *T. gambiense* to tryparsamide is more common than is believed. It can be acquired by passage through unaccustomed hosts, and inadequate treatment cannot be the only explanation.

BRUTSAERT and HENRARD (p. 704) give details of a method of cultivating trypanosomes in a medium containing Ringer solution with NaCl, Tyrode solution and citrated human blood. In taking blood, however, it is drawn into a syringe containing 1 per cent. polyanethol sulphonate of sodium (liquoïde Roche) instead of sodium citrate. This method is useful in diagnosis when trypanosomes cannot be seen in the blood.

STRÖDER (p. 717) found that after being subjected to a pressure of 800 atmospheres for 5 minutes, trypanosomes were infective, but that after 1,300 atmospheres they became rounded, and after 1,400 were non-pathogenic for mice.

Transmission.

VAN HOOF *et al.* (p. 334) found that preliminary meals on normal blood did not modify the infectibility of *G. palpalis* with *T. vivax*, whereas with *T. gambiense* infectibility is decreased. From dissections made of flies fed on non-transmissible, feebly transmissible and easily

transmissible strains these authors (p. 336) in agreement with YORKE conclude that proventricular infection does not necessarily imply ultimate invasion of the salivary glands and does not give any certain indication of cyclical transmissibility. Special long thin forms, apparently destined to invade the salivary glands, however, may be seen, and infection of the proventriculus by these confirms the belief that the normal infection of Glossina by *T. gambiense* is by the indirect route and dependent upon a preliminary development in the intestine.

VAN HOOF, HENRARD and PEEL (p. 335) found that a meal of blood containing tryparsamide or Bayer 205 does not destroy *T. gambiense* infecting the intestine, proventriculus and salivary glands of Glossina, but some of the flies are no longer able to transmit the infection. Virulence is changed but evolution is not influenced unless the drug is present in very large amounts. No inhibitory action on tryparsamide resistant trypanosomes was seen. Analogous results were given with *T. brucei* but *T. congolense* was not influenced.

Although *G. morsitans* at normal indoor temperatures shows positive phototropic reaction to light, JACK and WILLIAMS (p. 338) found that at temperatures over 30°C. it will seek the dark regardless of the temperature there, even if that temperature is rapidly fatal (49°C.). The distribution of tsetse flies in relation to vegetation and other features of their habitat may be explicable to a large extent on the basis of phototropic reactions. BAX (p. 337) shows that *G. swynnertoni* is attracted by the scent of oxen up to about 180 feet, and by the sight of moving oxen up to 450 feet. LLOYD (p. 702) points out that in Tanganyika Territory *G. morsitans* can live in certain favourable types of vegetation independently of an *Isoberlinia-brachystegia* community, and will not populate cultivated banana plantations in areas where favoured natural types of vegetation are present.

BOURGUIGNON (p. 329) considers that the danger of mechanical transmission in the south-east Congo is far from negligible. In certain regions *G. palpalis*, *G. morsitans*, *G. pallidipes* and *G. longipalpis* were all found. Both *G. palpalis* and *G. morsitans* were found by TARANTINO (p. 700) in the west of Abyssinia, though no human trypanosomiasis has been seen.

The pupation period of one specimen of *G. palpalis* was found by GUIBERT (p. 702) to be 31 days.

The native pig of the Congo may be a reservoir of *T. gambiense*. VAN HOOF *et al.* (p. 330) infected pigs both by inoculation and by bite. Parasites are scanty in the blood, and there is no pathological reaction, and the pig may be infective for at least a year. After cyclical transmission through three pigs in series, flies infected from the third produced infection in a human volunteer.

Clinical.

CORSON (p. 333) found that only two of four human volunteers were infected in an experiment on the transmission of *T. rhodesiense* by *G. morsitans*, and concludes that variations in resistance occur in man, since no loss of virulence was observed in the trypanosomes. Inapparent infection in man may not be rare, and spontaneous recovery probably also takes place.

Reviewing the results obtained from the examination of a large series of fresh gland juice preparations, stained thin and thick gland juice films, stained thick blood films, and triple centrifugation blood

preparations, RAOULT (p. 703) concludes that the thick blood film is in general the best method, and that stained gland juice is better than fresh. Stained juice preparations, however, are sometimes positive when the blood is negative. GUIBERT (p. 704) found trypanosomes in the bone marrow of 18 patients who had already been diagnosed, but failed in two in whom the diagnosis could not be made by other means, while VAN DEN BRANDEN concludes from the examination of 25 rats that bone marrow puncture is probably not of much value in diagnosis.

HOPE-GILL (p. 705) tested three groups of people with the serum-formalin reaction—patients infected with *T. gambiense*; apparently healthy natives from fly-free country; and out-patients other than detected cases of human trypanosomiasis. He concludes that the reaction (in an area where kala azar is not endemic), if positive within 60 minutes, is strong evidence in favour of trypanosomiasis; if negative at 60 minutes it is strong evidence against this disease, and if negative at 24 hours practically excludes it. Bayer 205 in the serum retards the end point, as does previous treatment with tryparsamide. Interference by syphilis is negligible. For the technique the original abstract should be consulted. GUIBERT (p. 706) has devised a simple method of applying the Pandy reaction to the cerebrospinal fluid, which could be used by itinerant sleeping sickness workers. The reagent is carbolic acid crystals 10 gm. in 150 cc. distilled water and the reading made in a nepheloscope. A black ring is negative. Positive readings vary from a greyish ring (slightly positive) through a blue tinge to a white cloud, when the reaction is strongly positive and indicates a protein value of more than 0·5 gm. per litre and usually more than 50 cells per cmm.

SCHWETZ (p. 702) reports acquired trypanosomiasis in a child less than 20 days old. The child died after remaining in good clinical condition for six months. In Tanganyika Territory (p. 339) a child was seen with *T. rhodesiense* in the blood and enormous numbers in ascitic fluid.

Chemotherapy.

It has been pointed out that trypanosomes require for their metabolism a large quantity of sugar [see also CHRISTOPHERS and FULTON above]. Synthalin produces hypoglycaemia, and it was thought that possibly its curative action in mice might be due to this action. LOURIE and YORKE (p. 342) however, from experiments with trypanosomes *in vitro*, conclude that the drug has a direct trypanocidal action, even on atoxyl- and Bayer-resistant strains. The effect of insulin was negligible. This finding led KING, LOURIE and YORKE (p. 343) to test other compounds, of entirely different chemical composition from the known trypanocidal substances, and of these n. undecane-1 : 11-diamidine was the most active, producing permanent cures in laboratory animals. These experiments open up a new field in chemotherapy. BROWNING (p. 716) supports the conclusions of LOURIE and YORKE that the therapeutic effect of synthalin (which he confirms) is not due to the hypoglycaemia it produces.

A further new type of trypanocidal agent has been found by BROWNING *et al.* (p. 344) in phenanthridinium compounds. Two of these are effective in mice against *T. brucei* (including a strain resistant

to arsacetin) and one is curative in *T. congolense* (and also *Sp. minus*) infections.

Testing the toxicity of the glyphenarsines (tryparsamide, tryponarsyl, etc.) on white rats, VAN DEN BRANDEN and POTTIER (p. 349) conclude that if visual troubles or other ill effects in abnormal numbers are produced, the cause is the state of the patient or faults of technique.

MURGATROYD (p. 341) tested the therapeutic action of neocryl on patients with *T. gambiense* infection. A rapid and definite clinical improvement occurred in practically every case treated, especially in the early cases with normal spinal fluids. The results resemble those to be expected from tryparsamide, but cannot be assessed fully until the later fate of the patients is known. Two other arsenicals, K.324 and K.352 were unsatisfactory. MACQUEEN (p. 697) also reports good initial results in the treatment of 60 cases with neocryl. Dimness of vision was a feature in two, one of whom died. The later effects of neocryl treatment were studied by ACRES (p. 341). He found the same rapid initial clinical improvement, but before six months after the completion of treatment, 2 of 9 first stage, and 7 or 8 of 12 second stage patients had relapsed. The drug is therefore disappointing.

STRANGEWAYS (p. 345) shows that thioarsinites (containing trivalent arsenic) are toxic to trypanosomes *in vitro* in high dilution, and this is due to hydrolysis and the liberation of the highly trypanocidal arsenoxide. Neoarsphenamine is probably adsorbed and oxidized, within the trypanosome or on its surface, to arsenoxide.

RADNA (p. 708) uses the intrathecal injection of arsebenyl to increase the permeability of the meningeal barrier to drugs injected in the ordinary way. He reports that 7 patients with abnormal spinal fluids were cured by this means. The technique is given.

As a result of the treatment of 34 patients with anthiomaline, BERTRAND (p. 708) concludes that it is of little use when the spinal fluid is changed, but is a compound of the first order in producing peripheral sterilization, even in cases resistant to tryparsamide. LAUNOY and PRIEUR (p. 350) found that amino-phenylstibinate of methylglucamine had good therapeutic action on mice infected with *T. brucei* and normal *T. annamense*. Naturally resistant *T. congolense* and artificially resistant *T. annamense* responded about equally.

No prophylactic or permanent therapeutic value for guineapigs with *T. gambiense* infection was found by WITTEBOLLE (p. 349) in the use of Trystibine (Dn 18).

BIOZZI (p. 716) tested colloidal zinc, silver and copper on *T. brucei in vitro* and in guineapigs. All exerted definitely lytic action but the copper preparation Zimocuprolo was the most successful, curing the animals on intravenous injection. It causes abscesses if injected subcutaneously.

The chemical composition of Surfen and Surfen C is given by IENSCH (p. 343), together with references to the successful treatment of *T. congolense* and *T. brucei* infections. A related substance is stated to possess activity against *T. cruzi*, which has not been affected hitherto by any chemotherapeutic agent. Surfen C is contraindicated in human trypanosomiasis by the production of acute nephritis. The use of Surfen C in Northern Rhodesia in the treatment of animals led to disastrous results, some dying within 15 minutes and showing extensive haemorrhages throughout the lungs, though others tolerated the drug fairly well (LE ROUX, p. 329). Similarly, experiments in the Gold Coast were unsuccessful in cattle, though good results were

obtained in dogs (STEWART, p. 330). The most effective drug is still tartar emetic, though horses with *T. brucei* infection were cured with naganol.

T'UNG (p. 714), in studying the photodynamic action of methylene blue on *T. brucei in vitro* found that in the presence of light a dilution of 1 in 100,000 was sufficient to produce immobilization, whereas without light 1 in 100 was required. The immobilizing effect was parallel to the lethal activity and immobilized trypanosomes failed to infect mice. Trypanosomes treated with the photodynamic action in a dilution insufficient to immobilize have a longer incubation period and survival than controls.

STRANGEWAYS (p. 346) states that in neutral or slightly alkaline solutions of glutathione and ascorbic acid exposed to air, a substance is rapidly formed which is very toxic for trypanosomes *in vitro*. This is probably hydrogen peroxide.

RADNA (p. 347) concludes that arsenic-resistant trypanosomes are just as chemo-sensitive *in vitro* as normal parasites, but his work is criticized by YORKE. He also observed that agglutinins were present in the sera of treated patients. He therefore used blood transfusion from convalescent patients in addition to chemotherapy, in the treatment of resistant patients. Though they did not respond to either method alone, the combination produced sterilization.

MENK and BOCK (p. 339) show that, in a patient with trypanosomiasis, diabetes, filariasis, tertian malaria and ankylostomiasis, insulin treatment was not interfered with by germanin and atebrin; germanin appeared to provoke the latent malaria; *Mf. diurna* was uninfluenced by the treatments, and germanin was effective in spite of the complications.

Prevention.

DANGERFIELD, GAUNT and WORMALL (p. 714) have described a method of determining Bayer 205 in plasma, but difficulties are present in applying it to urine. After intravenous injection the amount in the plasma (of rabbits and dogs) falls rapidly for the first few days, but it can still be found after 6 months, especially if administered in several small doses. This persistence may account for the marked prophylactic action of the drug. The prophylactic action of moranyl on a community of 621 individuals in the Congo was studied by ORLOVITCH (p. 340). Twenty new cases of disease were found in 1934, 21 in 1935. In January 1936 the whole population was given moranyl, and this was repeated twice at 3-monthly intervals. Examinations made regularly on considerable numbers, up to 3 months after the last injection, failed to reveal any cases, but 4 persons who had not received the drug were found to be diseased.

MACQUEEN (p. 697) states that it has become increasingly evident that in Nigeria treatment alone cannot control trypanosomiasis, and protective measures such as communal clearing and concentration of population can be the only radical cure, but VAN HOOF *et al.* (p. 699) consider that therapeutic warfare against human trypanosomiasis is the best method in the Belgian Congo.

NASH (p. 332) distinguishes between aggressive and defensive clearings against *Glossina*. The former aim at the eradication of dry season sanctuaries, the latter at the protection of the populace during the course of normal work or travel by driving back the fly to a safe distance. LE ROUX (p. 329) considers that an essential measure in the

eradication of trypanosomiasis of cattle in a district of Northern Rhodesia is that an attempt to reduce the food supply of *G. morsitans* should be made, for instance, by shooting buffalo.

Trypanosomiasis in Animals and Experimental Work.

VAN SACEGHEM (p. 716) inoculated calves of less than one month old with *T. congolense* passaged through guineapigs or rabbits (to eliminate infections, such as piroplasma, peculiar to the ox) and found that a benign infection lasting several months and ending in spontaneous cure resulted, leaving real immunity. MACQUEEN (p. 698) records an experiment from which it is concluded that certain cattle which had recovered from *T. vivax* infection and resisted subsequent injections of *T. vivax* and *T. congolense* possessed a natural rather than acquired resistance. PERLA (p. 350) failed to find consistent results in raising the natural resistance of mice against *T. equiperdum* and *T. brucei* by the administration of vitamin C prior to and throughout the course of infection.

CASTELLANI and JACONO (p. 328) report success in increasing the natural resistance of guineapigs to *T. gambiense* by the use of an antigen consisting of blood rich in trypanosomes treated with small quantities of bile or defibrinated homologous blood rich in the dead bodies and products of autolysis of trypanosomes.

TARANTINO (p. 700) shows that *T. brucei* and *T. congolense* infections of cattle are found in Abyssinia.

GUIDETTI (p. 328) produced various involution forms by exposing *T. brucei* from the blood of guineapigs to the action of certain dyes.

FRENCH (p. 712), working on *T. brucei* and *T. congolense* infections in animals, found that an increased excretion of nitrogen, body bases, chlorides and phosphates takes place. The relative proportion of albumin in plasma decreases, and that of euglobulin increases, progressively to death or crisis. There is no alteration of the blood urea. Increase in the sedimentation rate of red cells was found by the same author (p. 347) in cattle, sheep and donkeys infected with *T. congolense* and *T. brucei*. It was most marked in donkeys, but the rate of sedimentation of normal blood of these animals also shows differences.

In rabbits, the fatty constituents of the plasma, other than cholesterol, are markedly increased in *T. brucei* infection (T'UNG and MA, p. 713). PACKCHANIAN (p. 348) found that the electrical conductivity of defibrinated rat blood infected with *T. brucei* was higher than that of normal blood.

HOARE (p. 331) discusses the polymorphic trypanosome causing disease in African pigs and concludes that its correct name is *T. simiae* Bruce *et al.* 1912. *T. simiae* has been found to occur in pigs in the forest in the Gold Coast. Great and sudden mortality is experienced. The usual infection is by *T. brucei*. *T. theileri* was found in large numbers in the blood of cattle (p. 330). In French West Africa CURASSON (p. 331) observed epidemics of *T. brucei* infection of pigs. It may be benign or severe, depending, possibly, on successive reinfections and numerous passages through the pig, or on avitaminosis.

SHARROCKS (p. 348) found that a serum prepared by an antigen of living *T. hippicum* was antagonistic to more strains than one prepared by injecting trypanosomes killed by 0·5 per cent. phenol. The survival time in rats was in direct proportion to the amount of serum

administered. It appeared that trypanosomes resistant to one injection were not completely so to a second. There is a slight *in vitro* action of human serum on the organisms, but this is not responsible for the complete protection afforded to rats by the administration of normal human serum.

ONO (p. 713) found that the serum of rabbits immunized against turtle serum inhibited the trypanolytic action, but not the haemagglutinating action, of sera of the turtle and other cold blooded animals. Trypanosomes failed to resist fresh cold-blooded serum, but resisted inactivated serum, after long continued addition of the fresh serum to cultures.

TALIAFERRO (p. 717) contrasts the action of trypanocidal antibody and ablastin (reproduction-inhibiting antibody) in *T. lewisi* infections. Passive transfer of ablastin takes place as effectively in splenectomized and blockaded rats as in normal rats, but that of trypanocidal antibody is slightly impaired. Passive immunity with ablastin lasts only a few days. In normal rats it is replaced by active ablastic immunity, but in splenectomized and blockaded rats this does not occur. Passive immunity with the trypanocidal antibody lasts only a few days. Surviving trypanosomes in splenectomized and blockaded rats actively multiply owing to the failure of development of ablastic immunity.

An epidemic in rats due to *T. lewisi* is described by SLATINEANU *et al.* (p. 332). The symptoms are given.

CHAGAS' DISEASE.

LWOFF (p. 722) shows that growth of *T. cruzi* is abundant in serum to which is added both haematin and ascorbic acid.

LIEM SOEI DIONG (p. 719) showed that *Triatoma infestans* could transmit *L. icterohaemorrhagiae* and that when infected with paratyphoid organisms there was reason to believe that infection could be transmitted by the faeces and also by bite, after the manner of fleas infected with *Past. pestis*. For the complement fixation reaction this author uses a dry culture antigen prepared from condensation fluid of 14 day cultures of *T. cruzi* on Bonacci's medium.

MAZZA *et al.* (p. 718) found 33 per cent. of 1,722 specimens of *Triatoma infestans* infected with *T. cruzi*. These were captured in the sleeping rooms of dwellings in La Rioja. Triatoma captured in poultry yards and dove-cotes were not so heavily infected. WOOD and WOOD (p. 719) failed to find infection in the faeces of 287 cone-nose bugs and the blood of 60 rodents in the United States.

JOHNSON (p. 722) examined the cardiac changes in infected dogs. There is parenchymatous myocarditis with interstitial reaction. These may be acute or chronic and the focal lesions only occur on rupture of the cardiac fibres and liberation of the parasites, and are probably not due to toxins. Scarring and focal lesions are found in chronic cases when parasites cannot be seen. WOOD (p. 354) describes the cytological variations in white-footed mice infected with *T. cruzi*. Increase in large lymphocytes and decrease in eosinophil leucocytes were observed. The spleen is enlarged with hyperplasia of lymphoblasts and lymphocytes of the follicles and myeloid metaplasia, increase of megakaryocytes and hyperplasia of the reticulo-endothelial cells were produced. The bronchial, lumbar and inguinal glands were enlarged.

LACORTE (p. 721) uses an antigen prepared from the spleen of a well-infected puppy for the Machado reaction. Positive results were obtained in 68·5 per cent. of 35 cases.

MAZZA (p. 718) shows a fatality rate of 5·8 per cent. in 240 cases reported in the Argentine. In most of the dwellings occupied by patients, puppies and kittens were found naturally infected by *T. cruzi*. Descriptions of cases are given by TALICE *et al.* (p. 352), MAZZA *et al.* (pp. 353, 721) and LUNDEBERG (p. 720). Typical lesions are recorded, but in one meningo-choroiditis was present with encephalitis, a condition constantly present in animals but not hitherto reported in man. Dacryoadenitis and facial oedema are emphasized. TALICE (p. 351) found four cases of disease in Paysandú, where *T. infestans* is very prevalent.

IENSCH (p. 344) states that a substance related to Surfen and Surfen C possesses activity against *T. cruzi*, which has not been affected hitherto by any chemotherapeutic agent. KOFOID *et al.* (p. 353) working with tissue cultures of *T. cruzi* in embryonic rat heart, tested three arsenicals. Arsenious trithiosalicylic acid was the most toxic for *T. cruzi*, but was toxic also to tissue *in vitro*, and to mammals.

C. W.

CHOLERA.

Précis of Abstracts in this Section.

Olzscha (p. 364) describes a method of recording epidemics of cholera in Russia by means of "isodates," analogous with isobars, designating on a map places attacked by the disease at approximately the same time.

Raja (p. 365) mentions two pilgrim events in the propagation of cholera in India in 1938. Grattan (p. 365) incriminates infected butter as originating an outbreak in British troops. Hassett (p. 365) shows that a water-borne epidemic started in Swat State, far from the original focus, and was conveyed by pilgrims. Two carriers originated the outbreak in a jail reported by Maitra *et al.* (p. 366). Kundu and Pa How (p. 366) recovered *V. cholerae* from prawns in Burma.

Nguyen-Viem-Hai (p. 366) mentions cholera in French Indo-China.

The King Institute of Preventive Medicine, Guindy (p. 366) recognizes special zones of predominance of the Inaba and Ogawa types, and reports experiments on house flies which indicate that they are not efficient as carriers.

Nishimura (p. 367) found that the types of *V. cholerae* isolated over 15 years previously by Nobechi still retain their specific characters.

Pasricha *et al.* (p. 367) isolated *V. cholerae* from the stools of three of 2,000 patients (suffering from other diseases) in Calcutta. All had abdominal conditions, but not such as to suggest cholera. The characters of the vibrios are given.

The Prevention Bureau, Ministry of Health, Japan (p. 367) differentiates between the presumptive diagnosis of cholera based on morphology and a rapid result of the agglutination test on a slide, and the absolute diagnosis based on a more elaborate serum test and Pfeiffer's bacteriolytic test. Taylor (p. 368) reiterates the opinion that, for India, *V. cholerae* belongs to the special group "O" No. 1 (Gardner and Venkatraman), is non-haemolytic and gives characteristic biochemical reactions. Vibrios of other antigenic types exist abundantly in nature and it is not therefore surprising that they are found in the intestinal contents both of normal people and patients with cholera. Russo (pp. 368, 369) has tested many differential serum methods. He states that monovalent antiserum "O" Inaba is specific and preferable to "O" Ogawa and Napoli. Details of the essentials in the diagnosis of the true cholera vibrio are given. Inaba "O" antiserum prepared with lithium chloride antigen agglutinates at a higher titre than that prepared by other methods, and Inaba "O" antisera are more efficient than Ogawa "O." In the study of the specific polysaccharides of *V. cholerae*, Linton *et al.* (p. 370) emphasize that only strains freshly isolated in the early part of an epidemic should be used, as these contain a lipoid-polysaccharide complex which is absent from strains isolated later in an epidemic, or maintained for a long time in the laboratory.

Laigret and Auburtin (p. 370) succeeded in reviving *V. cholerae* which had been desiccated over calcium chloride for 24 hours and preserved at room temperature for five weeks. The epidemiological importance of this observation is noted. Working on an electrophoretic reaction, Linton *et al.* (p. 371) conclude that a shift in surface

potential is the cause of serological distinction of the R derivatives from their S homologues. LODENKÄMPER and KALLINICH (p. 371) claim that pleomorphic spheres, later growing out into vibrios, were obtained in the filtrate (through membrane) of a suspension of *V. metchnikovi*.

MERTENS *et al.* (p. 371) show that the El Tor vibrio is haemolytic to goat erythrocytes, belongs usually to the Ogawa type serologically and is usually Voges-Proskauer positive. BAARS (p. 372) studied the katabolic products formed from glucose in a special medium containing chalk. The ratio of CO_2 and fermented sugar was 0·88 for the V.-P. positive El Tor, and 0·52 for the V.-P. negative *V. cholerae*. MARRAS (p. 373) notes that the El Tor vibrio cannot be distinguished from *V. cholerae* by serological methods alone.

BERNARD *et al.* (p. 373) describe the technique for the extraction of the potent exohaemolysin of the El Tor vibrio from agar or bouillon. By the same technique a feeble endohaemolysin may be obtained from *V. cholerae* under certain conditions, and they (p. 373) consider that the same haemolysin may be common to the El Tor and the true cholera vibrio. They describe colour phenomena produced on suspensions of erythrocytes by the El Tor haemolysin. DEL FAVERO (p. 374) showed that laboratory strains of *V. cholerae* subjected to 15 passages and incubated at 20°C. became strongly haemolytic to sheep erythrocytes.

DE MOOR (p. 374) describes an outbreak of cholera-like disease near Macassar which was not explosive and which he considers to be endemic and not imported. About 400 strains of vibrios showing the characters of the El Tor type were isolated, they were distinctly haemolytic. VAN LOGHEM (p. 375) examined two of these strains and confirmed that they were of the El Tor type. He suggests the name El Tor enteritis for the disease. OMAR (p. 375) isolated an El Tor vibrio from the stool of a woman who had never left Egypt. She gave no history of significant intestinal disturbance.

SOLIMAN (p. 375) shows that saprophytic vibrios are not serologically identical with *V. cholerae*.

TAYLOR and AHUJA (p. 376) here amplify the contention that vibrios found in water may be found in the stools of cholera patients and normal people without possessing any aetiological relationship. Such vibrios (which do not agglutinate with pure " O " cholera serum) are almost universally found in water in North India, where cholera is not endemic. PANDIT and MAITRA (p. 376) isolated 33 strains from open surface waters in Assam. PASRICHA *et al.* (p. 377) found that vibrios isolated from water, flies and cockroaches were all inagglutinable with Inaba " O " serum and most belonged to Heiberg's types I and II. LAHIRI and DAS (p. 377) examined 75 strains of vibrios isolated from animals. None agglutinated with Inaba " O " serum. They suggest that the vibrios are present in the stools as contaminants.

VARDON and DATTA ROY (p. 377) describe a cheap papain-casein medium for the preparation of bacteriophage, especially choleraphage. GENEVRAY and BRUNEAU (p. 378) use a medium of 20 gm. peptone and 30 gm. salt to 1,000 cc. distilled water, at *p*H 8·5 for the rapid passages of culture from cholera stools and for the elimination of contaminants such as *Ps. pyocyanea* and *Proteus vulgaris*. BANERJEE (p. 378) uses Ramon's glucose bouillon for the anaerobic culture of *V. cholerae* as the *p*H does not change.

DeMonte and Gupta (p. 379) failed to isolate *V. cholerae* from the blood of 26 cholera patients, and Chatterjee and Malik (p. 379) failed in attempts with urine, but *V. cholerae* was isolated from material obtained by liver puncture as well as from the stools of a boy, reported by Pasricha *et al.* (p. 379). Ghosh (p. 379) records five patients with typical symptoms of cholera from whose stools *Ps. pyocyanea*, but no *V. cholerae*, was isolated.

On the assumption that hypochloraemia is one of the dangerous features of cholera, Massias (p. 380) injects 20 cc. of a 20 per cent. sodium chloride solution intravenously. Mortality has been lowered to 22 per cent. Thomas and Ting (p. 380) show that pyrogenic substances in the distilled water used for intravenous salines are responsible for untoward effects and advise rigid precautions (q.v.) in the distillation and preparation of the solution. Banerjee (p. 381) avoids the rigors common after intravenous saline by regulating the temperature of the solution to as much above 36·7°C. as the rectal temperature is below this.

Chatterjee and Deo (p. 381) regard the A phage as that mainly concerned in cure, but all available types should be used in massive doses at the earliest opportunity.

Smith (p. 382) shows how quarantine measures have reduced the incidence of cholera in the Philippines. The discovery of the cholera vibrio in stools, whether agglutinable or not, is sufficient to justify isolation and treatment. Wahbi (p. 382) notes that a quarantine station for pilgrims has been established at Rabha near the Irak frontier.

The vaccine used in the Federated Malay States (p. 382) is prepared from four strains and contains Inaba and Ogawa sub-types in equal proportions. Yü (p. 383) shows that smooth strains vary in virulence and protecting capacity ; strains with high animal virulence should be used for vaccines. Pasricha *et al.* (p. 383) notes the inefficiency of certain vaccines prepared by commercial firms and the good quality of those supplied by recognized laboratories in India. Caro (p. 383) shows that 94 per cent. of 546 patients in a Haiphong epidemic had not been vaccinated and that this epidemic, in which vaccination was performed on a large scale, was extinguished, though it continued to prevail in the Tonking delta long afterwards. But Quenardel (p. 384) states that in Tonking reports on the efficiency of the large scale vaccination procedure were by no means all favourable. *C. W.*

Olzscha (Reiner) with a Foreword by H. Zeiss. Die Epidemiologie und Epidemiographie der Cholera in Russland. Ein Beitrag zur Geomedizin. [**Epidemiology and Epidemiography of Cholera in Russia.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1938. Sept. 5. Vol. 121. No. 1. pp. 1–26. With 1 fig.

Russia, in somewhat the same way as Bengal, is regarded as one of the homes of cholera from which widespread epidemics may take their origin. The chief interest of the present article lies in the method of representing cholera incidence by maps, in which the separate " governments " of European Russia are variously shaded for the degree of mortality which they experienced in different cholera years and by a series of lines like isobars which are named " isodates." These lines, in red, enclose territories which have been involved in cholera epidemics at approximately equal times. The more closely the isodates are set,

the slower obviously has been the spread of cholera in that region. Remarks made in the introduction may be quoted :—" The errors of all previous maps are avoided by Olzscha with the introduction of the 'Isodates' . . . . With this method it will be possible . . . not only to represent the course of epidemics, such as cholera, plague, influenza, small pox, but perhaps also to probe more deeply the secrets of their progression in every country and part of the earth." They may serve, graphically to depict the original endemic area of an epidemic.

Russia has experienced 55 cholera years since the epidemic of 1823 but only 13 of these can be regarded as major epidemics, while about half are graded as evanescent. It might have been expected that in those epidemics which repeated themselves in succeeding years the second-year epidemic would tend to be of less degree than the first, but the reverse is frequently the case. A series of cholera years, 1830, 1831, 1847, 1849, 1853, 1855, 1870 and 1871 are dealt with seriatim in the text and shaded maps with " isodate " lines are given of these years in a special folding plate. *W. F. Harvey.*

RAJA (K. C. K. E.). Note épidémiologique sur le choléra dans l'Inde en 1938. [**Cholera in India in 1938.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Nov. Vol. 30. No. 11. pp. 2552–2561.

The period of cholera prevalence covered is not the whole year but only that up to the end of August. Figures are given for the several provinces of India which admit of direct comparison of incidence and mortality. Two pilgrim events are selected for special mention in connexion with the propagation of cholera from well defined centres. These were the " Kumbh Melas " of Hardwar and Bindraban.

W. F. H.

GRATTAN (H. W.). **An Outbreak of Twenty-Eight Cases of Cholera among British Troops in Benares during September–October, 1912.** —*Jl. Roy. Army Med. Corps.* 1939. Jan. Vol. 72. No. 1. pp. 21–25.

The author describes an epidemic of cholera among British troops which occurred many years ago. His verdict was that the infection had originated in contaminated butter. *W. F. H.*

HASSETT (C. J.). **A Cholera Epidemic in Swat State, N.W.F., 1937.**—*Indian Med. Gaz.* 1938. Oct. Vol. 73. No. 10. pp. 602–605. With 1 map & 1 graph.

The Swat State of the Malakand Agency in the North-West Frontier Province of India is not an endemic focus of cholera, which when it does occur is always imported from outside. The present epidemic started suddenly. It was obviously water-borne and, with some difficulty, the human element by which the water had been infected was traced. It proved to be a party of Hindu pilgrims. The importance of the outbreak from the public health point of view lies in that the disease must have been carried a long distance before making itself apparent in an explosive outbreak. *W. F. H.*

BANERJEE (D. N.). Epidémiologie du choléra dans l'Inde. [**Epidemiology of Cholera in India.**]—*Mouvement Sanitaire.* 1938. Oct. Vol. 15. No. 174. pp. 473–476.

MAITRA (G. C.), SEN GUPTA (P. N.) & THANT (U.). **Cholera Epidemics in Burma and the Type of Vibrio associated with them.**—*Indian Med. Gaz.* 1938. July. Vol. 73. No. 7. pp. 406–408. [10 refs.]

The interesting point recorded in this article is of three cases of cholera occurring in a jail set apart for habitual offenders, having no association with outsiders. A search was instituted and all prisoners employed in the jail kitchen and all contacts with actual cases came under examination. Two carriers of true cholera vibrios were in this way discovered and they were isolated, until bacteriological reports declared them to be free of infective cholera organisms. *W. F. H.*

KUNDU (K. P.) & PA HOW (U.). **Prawns as a Possible Vector of** *V. cholerae.*—*Indian Med. Gaz.* 1938. Oct. Vol. 73. No. 10. pp. 605–606.

Prawns caught in the delta districts of Burma are brought to Rangoon for sale. Various consignments were examined and two prawns yielded " typical cholera vibrios the agglutination and cultural reactions of which would have led to the diagnosis of cholera had they been isolated from the excreta of a suspected case of cholera."

W. F. H.

NGUYEN-VIEM-HAI. Rapport sur l'épidémie de choléra de 1937 dans la province de Kien-An. [**The Epidemic of Cholera in Kien-An in 1937.**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. Apr. Vol. 17. No. 4. pp. 426–432.

A complete account is given of the ravages of cholera in a special northern province of French Indo-China during 1937 the details of which are of official interest. *W. F. H.*

GUINDY : REPORT OF THE KING INSTITUTE OF PREVENTIVE MEDICINE FOR YEAR ENDING 30TH SEPTEMBER 1937 [SHORTT (H. E.). Director]. pp. 23–28.—**Cholera Enquiry.**

Some suggestion has been made that the Ogawa strain of the cholera vibrio might only be a laboratory phase of culture and not a vibrio occurring in nature. This possibility seems to have been definitely negatived, as " several hundred Ogawa strains have been met with in the course of investigation." A topographical distribution of the two main cholera types, Inaba and Ogawa, has been met with sufficiently distinct apparently to justify recognition of special zones or areas of predominance. No difference in the severity of Inaba or Ogawa epidemics could be demonstrated.

A special research into the rôle of the common house-fly in the spread of cholera showed that ingested vibrios are either rapidly excreted or are destroyed in the gut of the fly. Further experiments were designed to test the vibriocidal action of extracts of the crop and intestine, with the result that " while the control plates showed growth of cholera the plates inoculated with a mixture of cholera suspension and the extract after one hour's contact remained sterile."

W. F. H.

NISHIMURA (Haruo). **On the Types of Cholera of Shanghai Epidemic of 1937.**—Reprinted from *Jl. Shanghai Sci. Inst.* 1938. July. Section 4. Vol. 3. pp. 251–268.

The 16 strains of cholera isolated in the Shanghai epidemic of 1937 were compared with standard type strains: Inaba (original type), Hikojima (middle type) and Ogawa (variant type). Although it is over 15 years since these types were isolated by NOBECHI they still retain their specific character. All the 16 strains now tested proved to be of the original Inaba type. *W. F. H.*

PASRICHA (C. L.), LAHIRI (M. N.) & DAS (P. C.). **The Isolation of *Vibrio cholerae* from Non-Cholera Individuals.**—*Indian Med. Gaz.* 1938. Nov. Vol. 73. No. 11. pp. 669–670.

It is now very generally maintained that the "true" cholera vibrio must be agglutinated by a pure "O" serum and that agglutination by an "H+O" serum is not specific. Examination for vibrios has been made in the Carmichael Hospital, Calcutta, during the past five years, of stools of 2,000 patients suffering from diseases other than cholera, with varying results. Recently the investigation has become more specific with appropriate sera. The examination of the stools for vibrios was carried out after a two-stage enhancement in peptone water and isolation on Aronson's medium. The *V. cholerae* was isolated from three individuals:—(1) with ill-defined abdominal symptoms for 2½ months before admission; (2) with chronic diarrhoea on admission, and (3) with a history of dysentery 6 months prior to admission. The vibrios isolated were monoflagellate, of Heiberg's group I, agglutinable to full titre with cholera (Inaba) "O" and "H+O" serums, inagglutinable with pure Ogawa serum, non-haemolytic to goat erythrocytes, not phage-contaminated, and they were acted on by the different types of cholera phage. *W. F. H.*

JOURNAL OF THE PUBLIC HEALTH ASSOCIATION OF JAPAN. 1938. Sept. Vol. 14. No. 9. pp. 1–6.—**Guide for the Identification of Cholera Vibrios in Stools.** By the Prevention Bureau, Ministry of Health and Social Affairs.

Clear instructions are given in this guide to the identification of cholera vibrios which should be very useful to all laboratory workers faced with the necessity of furnishing a verdict on the early cases of a possible cholera epidemic. The headings indicate the general course of the procedure:—collection and handling of the materials; microscopic examination of smears; cultures and immunological tests. Diagnosis is divided into the two headings of (*a*) presumptive and (*b*) absolute. The presumptive judgment of cholera is accorded "when the morphological structure and motility of the bacteria correspond to those of cholera vibrios and a distinct positive result is observed within 2 or 3 minutes in the agglutination test on a glass slide." An absolute judgment is dependent on a more elaborate serum test with agglutination to titre and inclusion of Pfeiffer's bacteriolytic test. The Pfeiffer reaction is very often omitted. *W. F. H.*

TAYLOR (J.). Nouvelles observations sur la valeur de l'agglutination " O " pour le diagnostic du vibrion cholérique. [**New Work on the Value of " O " Agglutination for the Diagnosis of the Cholera Vibrio.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. July. Vol. 30. No. 7. pp. 1442–1454.

The task of laying down criteria for the absolute diagnosis of a true cholera vibrio has been continued by the Indian workers. Some of the discussion of the subject and some reference to the work itself will be found in the abstracts : TAYLOR, PANDIT and READ [this *Bulletin*, 1937, Vol. 34, p. 783] ; TAYLOR [this *Bulletin*, 1938, Vol. 35, p. 304] and Paris, Office International d'Hygiène Publique [this *Bulletin*, 1938, Vol. 35, p. 734]. Whereas the Commission on Cholera of the International Office of Hygiene expressed the opinion that, so far as present knowledge goes, it is not yet possible to use exclusively serums of type " O " for the diagnosis of pathogenic cholera vibrios, bacteriologists in India do not subscribe to this and consider that the Commission has based its opinion on the fact that certain strains isolated from clinical cholera showed only " H " agglutination. There are detailed facts given in the present communication in support of the view that, for India, in epidemic and endemic cholera the associated *V. cholerae* belongs to the special group " O " No. 1 (Gardner and Venkatraman), is non-haemolytic and gives characteristic biochemical reactions. It is, however, admitted that vibrios of numerous other antigenic types than this " O " and of various biochemical types exist abundantly in nature. Strains which possess an " H " antigenic fraction in common with *V. cholerae* or belong to " O " antigenic groups other than " O " No. 1, have been isolated from both healthy individuals and cholera cases and also from water in circumstances where cholera contamination can be absolutely excluded. It is not to be wondered at, therefore, that such vibrios will be found in the intestinal contents both in the healthy and in those stricken with cholera. These vibrios will give their own serological reactions, but they are not the reactions of a cholera vibrio. The name " El Tor " vibrio is to be reserved for haemolytic strains of the group " O " No. 1. They have an antigenic structure identical with that of the Inaba and Ogawa types.

Some of the findings of the consultative Committee of the Indian Research Fund Association held in December 1937 are given. The Committee did not consider that a diagnosis of *V. cholerae* was valid for vibrios which only agglutinated with a serum " O "+" H " and not with pure " O " serum. The facts presented in the present report are considered to add to the proof of this assertion. Although the Indian Committee adheres strongly to the view that serological diagnosis of *V. cholerae* must be carried out separately by " O " agglutination, it does not suggest that measures for combating cholera on the occurrence of a suspicious case should be held up until the vibrio is isolated and identified. Actually the isolation itself is not always an easy matter even in full epidemic. *W. F. H.*

RUSSO (Canio). Du diagnostic des vibrions cholériques. [**Diagnosis of the Cholera Vibrio.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. July. Vol. 30. No. 7. pp. 1455–1505. [15 refs.]

This long and extremely useful review contains references to most of the recent work on the serological and biochemical identification

of the cholera vibrio. The author's own work has been directed to testing many of the differential serum methods, which have been proposed, upon a large series of laboratory strains. He has also made a contribution to the effect produced upon test vibrios by physical and chemical agents such as lithium chloride, phenol and alcohol.

W. F. H.

Russo (Canio) Struttura antigena del vibrione colerigeno di Pacini-Koch in rapporto all'agglutinazione e valore dell'antigeno e dell' immunsiero O Inaba e Ogawa nella diagnosi del colera. [**Antigenic Structure of the Cholera Vibrio and Value of the Antigen and Immune-Serum of Inaba and Ogawa in Diagnosis.**]—*Giorn. di Batteriol. e Immunol.* 1938. July. Vol. 21. No. 1. pp. 1–45. English summary. Also in *Rendiconti Istituto de Sanità Pubblica.* Rome. 1938. Vol. 1. Pt. 2. pp. 454–493. [10 refs.]

In this study the relative value of different O and HO sera for the identification of the true cholera vibrio is carefully investigated. A true cholera vibrio must have been isolated from a clinically typical case of cholera, must agglutinate with specific serum and must not be haemolytic. Complementary characters are found in : (1) the allocation of the vibrio to the Heiberg group I (fermentation with production of acid but not gas, mannose-positive, saccharose-positive and arabinose-negative), (2) positive cholera red reaction, and (3) the negative Voges-Proskauer reaction. As first cases of cholera in an endemic are not always typical it is wise to have specific bacteriological characters established before the official announcement of cholera is made.

The commonly used antisera were tested thoroughly and the verdict arrived at is the generally accepted one, that monovalent antiserum O Inaba is specific and preferable to antisera O Ogawa and Napoli. Inaba O serum is rapidly agglutinating, whereas antiserum HO Napoli is slow in development of agglutination, has a flocculent instead of granular character, and, although its titre is high, possesses group and imperfectly specific agglutinins. *W. F. H.*

Russo (Canio). Nuovi contributi sul valore dell' antigene e dell' anticorpo somatico del vibrione del colera in rapporto alla diagnosi sierologica specifica. [**Value of the Somatic Antigen and Antibody of the Cholera Vibrio in Serological Diagnosis.**]—*Rendiconti Istituto di Sanità Pubblica.* Rome. 1938. Vol. 1. Pt. 2. pp. 494–505.

The summary here given of the author's results is a continuation of those abstracted above.

(1) The somatic and thermo-resistant O agglutinogen of the cholera vibrio determines the production in the rabbit of specific antibodies which can be identified serologically. (2) The classic pathogenic strain of the cholera vibrio gives a well defined agglutination with anti-O serum, which is higher with the homologous antisomatic serum and still higher with the serum derived from an antigen treated chemically than with one subjected to physical agents. (3) Lithium chloride added to agar at 0·5 per cent. inhibits the development of the cilia and the vibrio loses its H antigen. After four to six subcultures a culture may be obtained of atrichous vibrios with purely O antigen which can be maintained on lithium agar. (4) A 0·1 per cent. phenol agar inhibits the development of the cilia and produces an O cholera vibrio. Its structure becomes

altered with further subculture and thus phenol agar is not suitable for the isolation and preservation of O somatic antigen. (5) The non-specific ciliary H antigen is eliminated by the addition in suitable proportion of 96 per cent. alcohol to a cholera suspension and alcohol agar can also inhibit the culture. (6) Inaba O antiserum prepared with lithium chloride antigen has been shown capable of agglutinating at 1–6000; this is a higher titre than is given by a somatic serum obtained with O antigen heated for two hours at 100°C. or with phenol or with alcohol antigens which give agglutinations of 1–3000, 1–2000 and 1–1000 respectively. (7) Inaba O antisera of all these antigens have higher titres than Ogawa O antisera and Napoli O antisera. (8) The anti-O serum produced with lithium somatic Inaba O antigen should help to bring about concordant results in different laboratories in the essential diagnosis of the typical cholera vibrio.

LINTON (Richard W.), SHRIVASTAVA (D. L.), SEAL (S. C.) & MOOKERJI (S. P.). **Studies on the Specific Polysaccharides of the Vibrios. Part II. Chemistry and Serology.**—*Indian Jl. Med. Res.* 1938. July. Vol. 26. No. 1. pp. 41–54. [10 refs.]

The authors continue their studies on the chemical architecture of the vibrios of their six groups by endeavouring to correlate specific precipitin serological reactions with polysaccharide composition. It had already been shown that such polysaccharides could be used in precipitin test to distinguish easily between El Tor vibrios and vibrios isolated from cholera cases; the present work is in continuation of that finding. The antisera used were obtained by injection of 18-hour agar cultures intravenously in rabbits, for it had not been found possible to obtain antisera to the polysaccharides themselves. In the present chemical and serological research previous findings were confirmed that, "cholera strains are quite distinct from strains from other sources." Particular emphasis is laid on the discovery of two types of cholera strains, one which is the freshly isolated strain of the early part of an epidemic and the other the strain of the later part of an epidemic. The fresh strain contained a lipoid-polysaccharide complex which was absent in the second type and also absent in "strains maintained for a long time in the laboratory and in water and carrier strains." It would appear desirable therefore that only freshly isolated strains should be used "in studies of antigenic structure." *W. F. H.*

LAIGRET (J.) & AUBURTIN (Mme. P.). Sur la reviviscence du vibrion cholérique après sa dessiccation et sa conservation à l'état frais. [**Revival of the Cholera Vibrio after Desiccation and its Preservation in Nature.**]—*Bull. Acad. Méd.* 1938. July 5. 102nd Year. 3rd Ser. Vol. 120. No. 26. pp. 50–54.

Desiccation has usually been considered fatal to cholera vibrios, which were classified in this respect as very fragile organisms. The present experiments have shown that it is possible to revive the cholera vibrio even after it has been dried for 5 weeks. The technique of drying is to centrifuge down a cholera suspension, mix the deposit with equal parts of a mixture, disodium phosphate 10 parts and monopotassium phosphate 1 part; desiccate this mixture over chloride of calcium for not more than 24 hours and preserve at room temperature. In restoring the vibrio to life from its presumably dormant condition the first

culture set up must be in bouillon. Desiccation for longer than 24 hours or by other methods, such as over sulphuric acid, kills the vibrios. They remain during their period of preservation strictly aerobic.

The author speculates on the importance of this finding in its epidemiological aspect. Is it possible that in nature cholera vibrios may become dried and serve at a later time as the cause of a new outbreak, or again is it possible that dry vibrios may be transported as dust and give rise to infection at a distance? *W. F. H.*

LINTON (R. W.), MITRA (B. N.) & SEAL (S. C.). **Electrophoresis and Metabolism of Some Vibrio Strains in Relation to Variability and Chemical Classification.**—*Indian Jl. Med. Res.* 1938. Oct. Vol. 26. No. 2. pp. 329–334.

Much work has been done by Linton and his collaborators on the chemical structure and metabolism of cholera vibrios, by which they have been separated into a number of groups. To the methods previously adopted they now add an electrophoretic reaction, combining it with the other features for the determination of possible differences between " S " and " R " vibrio homologues. It is the surface electric charge of the organisms which is studied by subjecting them to electrophoresis. The conclusion is reached that :—" The serological changes brought about by treatment with antiserum or by other processes follow changes in chemical structure, metabolism and surface potential. A shift in the latter is the cause of serological distinction of the ' R '-derivatives from their ' S '-homologues and partly accounts for the uniformity of serological behaviour of the rough vibrio strains in general." *W. F. H.*

LODENKÄMPER (H.) & KALLINICH (W.). Entwicklungsstudien an Vibrionen. I. Mitteilung. [**Developmental Cycle in Vibrios.**]—*Zent. f. Bakt.* I. Abt. Orig. 1938. Oct. 17. Vol. 142. No. 7/8. pp. 376–388. With 4 figs. [11 refs.]

This communication raises once more a subject which has been for some time in abeyance, that of the existence of a cycle of development in bacteria. The organism chosen for the purpose of experimentation in the production of bacterial polymorphism was *Vibrio metchnikovi*. A filtrate of this organism through a Berkefeld candle gave no indication of the presence of filtrable forms, but membrane filtration furnished a product which showed, after remaining clear for 3 weeks, some pleomorphic spheres. These spheres could be made to grow out into vibrios on nutrient agar. *W. F. H.*

MERTENS (W. K.); MOCHTAR (A.); BAARS (J. K.). Vergelijkend onderzoek van *V. cholerae* en V. El Tor. Mededeeling I. [**I. Comparison of** *V. cholerae* **and** *V. El Tor.*] [MERTENS & MOCHTAR].—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1938. Oct. 25. Vol. 78. No. 43. pp. 2642–2664. [Refs. in footnotes.] Mededeeling II. De reactie van Voges-Proskauer in de cholera-diagnostiek. [**II. Voges-Proskauer Test in Cholera Diagnosis.**] [MOCHTAR & BAARS].—*Ibid.* pp. 2665–2671. [10 refs.] English summary.

[So many laboratories now preserve their own and the type strains of *V. cholerae* and *V. El Tor* that it is possible to obtain large numbers

of these for comparative purposes. The history of the cholera-El Tor controversy is well known. It is, however, of the utmost importance to distinguish between these two main types, as decisions at frontier and other quarantine stations turn on the diagnosis made. The bacteriological procedure for making the decision is already almost stereotyped]. A summary of the conclusions arrived at by the authors may be given :—

I. (1) Cholera and El Tor strains belong to HEIBERG's type I. They form acid in glucose, mannite, maltose, saccharose and mannose but not in arabinose. (2) El Tor vibrios haemolyse goat erythrocytes in bouillon in 24 hours and develop a rose halo around their colonies on blood agar, while cholera is non-haemolytic. (3) Cholera strains belong serologically to either the INABA or the OGAWA type. El Tor strains belong to the OGAWA type and only a few to the INABA type.

II. All of the 176 strains of vibrios studied possessed certain common characters :—(*a*) production of acid in glucose, mannitol, maltose, dextrose and mannose ; no acid in lactose and arabinose ; positive indole and cholera-red reactions ; (*b*) agreement with the "O" sub-group of GARDNER and VENKATRAMAN.

Out of the 176 strains 105 were non-haemolytic and are to be regarded as true cholera strains. They were all, except two, Voges-Proskauer negative. Seventy-one strains, being haemolytic, are of El Tor type and of these 62 were Voges-Proskauer positive and the remaining 9 negative. *W. F. H.*

BAARS (J. K.). Glucose-dissimilatie door *Vibrio cholerae* en Vibrio El Tor. [**Dissimilation of Glucose by** *V. cholerae* **and** *V. El Tor*.]—*Antonie van Leeuwenhoek Nederl. Tijdschr. v. Hyg. Microbiol. en Serol.* 1938. Vol. 5. No. 1. pp. 43–53. [Refs. in footnotes.] English summary. Also in *Geneesk. Tijdschr. v. Nederl.-Indië.* 1938. Nov. 15. Vol. 78. No. 46. pp. 2881–2890.

It is generally contended that cholera vibrios ferment glucose without production of gas and it has been shown that the formation of acid from carbohydrates is such that a culture is rendered sterile in 2 to 3 days. This last finding suggested that a research into the katabolic products formed from glucose necessitated the development of culture conditions which should, at least, be as favourable as possible to continued vibrio growth. The first medium used had the composition :—glucose 5 ; difco peptone 5 ; di-pot. phosphate 5 ; sod. chloride 5 ; tap water 1,000, with *p*H 7·4. In the matter of continued growth and activity improvement was obtained by adding chalk to the medium to neutralize the acid formed and increasing the amount of glucose present. The medium now had the composition :—glucose 20 ; difco peptone 5 ; sod. chloride 5 ; calc. carbonate 15 ; distilled water 1,000, with *p*H 7·2. In this medium, which was daily shaken and incubated at 27·5°C., abundant gas developed. The purity of the culture was checked at the end of the test. Analysis of the products of growth showed that both *V. cholerae* and *V. El Tor* gave as products :—carbon dioxide, formic acid, acetic acid, lactic acid, succinic acid and ethyl alcohol. As one of the distinguishing characters of the two vibrios is that the cholera vibrio is Voges-Proskauer negative while the El Tor vibrio is V.-P. positive, it was natural that the latter should be found to produce acetylmethyl-carbinol with, sometimes, traces of 2–3 butylene glycol or diacetyl. "The ratio of produced carbon dioxide

and fermented sugar was found . . . to be for the V.P. positive *V. El Tor* strains 0·88 and for the V.P. negative *V. cholerae* strains 0·52."

W. F. H.

MARRAS (F. Maria). L'agglutinazione nell' identificazione del vibrione del colera non è specifica ed in molti casi non ha valore. [**Agglutination not Specific in the Identification of the Cholera Vibrio.**]—*Ann. d'Igiene.* 1938. Nov. Vol. 48. No. 11. pp. 649–663.

Five vibrios isolated at El Tor during the pilgrimage of 1936 were from individuals without any sign of cholera. They produced indole, were strongly haemolytic to sheep erythrocytes and agglutinated at dilution of 1 : 1000 with testing cholera sera for both "O" and "O+H" antigens. Similar results were obtained by absorption and cross agglutination tests. Again the same result was obtained with 27 vibrios isolated at El Tor during 1937 and with vibrios isolated in 1938. The conclusion is drawn that the cholera vibrio cannot be differentiated serologically from the vibrio El Tor. *W. F. H.*

BERNARD (P. Noël), GUILLERM (J.) & GALLUT (J.). Extraction de l'hémolysine du vibrion d'El-Tor. [**Extraction of El Tor Haemolysin.**]—*C. R. Soc. Biol.* 1939. Vol. 130. No. 1. pp. 23–24.

It had been shown that it was possible to extract a haemodigestive ferment from the agar on which the cholera vibrio had been grown for 3 days [this *Bulletin*, 1938, Vol. 35, p. 308]. In the same way the El Tor vibrio impregnates the substance of the nutrient agar with its characteristic haemolysin, which can be extracted. The method of extraction is to soak the agar in 0·9 per cent. toluene-covered saline water of *p*H 8·2. This fluid is freed from particulate matter and residual organisms by frequent centrifuging, but must on no account be filtered through a filter candle. It is saturated with ammonium sulphate and still the *p*H 8·2 must be preserved. A similar technique is employed to obtain haemolysin from a bouillon culture and the product may be 200 times more haemolytic than the original bouillon culture. It is not possible to extract by this technique a haemolysin from the cholera vibrio culture, even when the organism exhibits a temporary haemolytic power on first isolation. If a suspension of cholera vibrios, however, is kept for 5 days at incubation temperature or a bouillon culture for 9 days it becomes possible then to extract a feeble haemolysin. The two substances thus extracted from El Tor and cholera vibrios respectively correspond, evidently from the conditions for their production, to exohaemolysin and endohaemolysin. *W. F. H.*

BERNARD (P. Noël), GUILLERM (J.) & GALLUT (J.). Sur quelques caractères des hémolysines des vibrions cholériques. [**Haemolysins of Cholera Vibrios.**]—*C. R. Soc. Biol.* 1939. Vol. 130. No. 3. pp. 228–230.

The hypothesis is presented here that one and the same haemolysin is common to the El Tor and the true cholera vibrios. In the former it is free and in the latter it is combined with a neutralizing substance. Would not, then, a certain variability in the amount of the two constituents of the complex suffice to explain what are, certainly, anomalous features of the cholera vibrio haemolysin? *W. F. H.*

BERNARD (P. Noël), GUILLERM (J.) & GALLUT (J.) L'hémolyse par le vibrion d'El Tor et par son hémolysine. [**Haemolysis by the El Tor Vibrio and by its Haemolysin.**]—*C. R. Soc. Biol.* 1939. Vol. 130. No. 2. pp. 147–148.

The haemolysin of the El Tor vibrio obtained by extraction [see above] produces a limpid red ruby colouration in the suspension of erythrocytes on which it acts, whereas the addition of a suspension of living vibrios from an agar culture brings about, after some minutes at 37°C., a violet turbidity. It seems probable that the violet colouration of the erythrocytes is a phenomenon of reduction. It does not occur if the vibrios are killed. This same violet tinting of a suspension of erythrocytes is also caused by glutathion or even yellow of egg. It disappears when haemolysis occurs. *W. F. H.*

DEL FAVERO (E.). Influenza del fattore termico sul vibrione colerigeno e sue proprietà di fronte alla emolisi. [**Effect of Heat on the Cholera Vibrio and its Haemolytic Power.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1938. July. Vol. 19. No. 7. pp. 430–431.

Laboratory strains of the cholera vibrio which were agglutinable to high serum-titre and were non-haemolytic have been subjected to 15 passages and incubation at 20°C. There was no appreciable alteration in their agglutinability but the vibrios became strongly haemolytic to sheep erythrocytes, which were also agglutinated. *W. F. H.*

DE MOOR (C. E.). Un vibrion du type " El Tor " responsable, dans la partie sud de l'île de Célèbes (Indes Néerlandaises), d'une épidémie présentant les apparences complètes du choléra. [**An El Tor Vibrio as Cause of a Cholera Epidemic in Celebes.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. July. Vol. 30. No. 7. pp. 1510–1519.

A description is given here of an epidemic of cholera or cholera-like disease in villages near Macassar the capital of the island of Celebes. The importance of the occurrence rests on whether the vibrio isolated can be truly designated as an El Tor type. Cases varied in their gravity from a *cholera siderans* type, where death supervened in a few hours, to a cholerine or choleraic diarrhoea and even symptomless type. Rice water stools, dehydration and development of *oligaemia sicca*, thready pulse, dyspnoea, cyanosis and the algid state were all observed in the worst cases. In its epidemiology the outbreak occurred as one or two cases a day, often at several days' interval, without explosive development. The first epidemic at the end of 1937 was not accompanied by bacillary dysentery, but that of 1938, which raged during the rainy season, was accompanied by a serious epidemic of Shiga dysentery. Bacteriological examination of isolated vibrio cultures confirmed the cholera-like characters, morphological, biochemical and serological. The agglutination tests applied were those of the non-specific " H " agglutinin and that of the specific " O " agglutinin (Inaba and Ogawa type). These were positive, as also was the Pfeiffer test. Haemolytic activity was shown for goat erythrocytes. About 400 strains were examined and they were all practically identical: in particular they were distinctly haemolytic.

The author considers the disease here in question is endemic and not an accidental importation. Further examination of the vibrios and commentary on their position is provided by Professor van Loghem.

W. F. H.

VAN LOGHEM (J. J.). Un vibrion " El Tor " pathogène isolé aux Indes Néerlandaises. [**A Pathogenic " El Tor " Vibrio from the Netherlands Indies.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. July. Vol. 30. No. 7. pp. 1520–1523.

Two of the vibrio strains, 757 and 794, isolated by Dr. de MOOR in the Macassar epidemic described by him were sent to Professor van Loghem at Amsterdam for examination. This examination confirmed the diagnosis already made of a pathogenic El Tor vibrio in all respects. The most important characters of the vibrio were :—(1) It gave the reactions of Heiberg's group I ; (2) The modified Voges-Proskauer reaction was positive ; (3) Marked haemolysis occurred in goat blood bouillon in 24 hours ; (4) Positive agglutination was manifested with anticholera serums HO and O (Gardner group I) and there was no loss of agglutinability of suspensions heated for 3 hours at 56–57°C. ; (5) Marked toxicity was shown for the white rat of 5-day bouillon cultures, killed with phenol or as Seitz filtrates. These are the characters of an El Tor vibrio. Van Loghem, as a result of his examination, says :— " On the assumption that the vibrio of Koch and the vibrio ' El Tor ' represent two different bacterial species, I conclude that the Celebes outbreak is not identical with true cholera. With this dualistic view as basis I propose to distinguish the diseases caused by the two vibrios and to name that caused by the El Tor vibrio *enteritis choleriformis*, or more simply El Tor enteritis." *W. F. H.*

OMAR (Wasfy). **Vibrio El-Tor isolated from the Stools of an Egyptian who has never been to Hedjaz.**—*Jl. Egyptian Med. Assoc.* 1938. July. Vol. 21. No. 7. pp. 415–428.

At the Tor camp laboratory during the years 1930–1938 the number of stool examinations of returning pilgrims was 61,339 with isolation of 583 vibrios of which 77 were agglutinable El Tor vibrios. It is to be noted, however, that during the first 6 years only an HO serum was used, whereas latterly a standard O serum has been used. The presumption is that the pilgrims pick up an El Tor vibrio while on pilgrimage and this seems to be substantiated by the examination of 1,532 Egyptians some years ago before they started : no El Tor vibrios were discovered. Now the author has made examination of 1,199 specimens of stools during the off-pilgrimage season. He has isolated 16 vibrios, " of which one was of El Tor type agglutinable with the ' H+O ' and ' O ' standard sera. The carrier of this vibrio is a woman who has never left Egypt." Although she suffers from cystitis she is in good general health and " gives no history of any present or remote signs of any significant intestinal disturbance." The medium which has been found most satisfactory for isolation of vibrios is the glycocoll-haemoglobin medium of Vedder and Van Dam. *W. F. H.*

SOLIMAN (Nasr). **A Serological Classification of 22 Vibrios.**—*Jl. Egyptian Med. Assoc.* 1938. Sept. Vol. 21. No. 9. pp. 603–605.

Thirteen saprophytic vibrio strains isolated at El Tor have been compared serologically with standard cholera vibrios. These

saprophytic vibrios are found to be heterogeneous among themselves and, although they share H agglutinogen with the cholera vibrio, are not serologically identical with it. *W. F. H.*

TAYLOR (J.) & AHUJA (M. L.). **Incidence and Characters of Vibrios in Waters in Northern India.** —*Indian Jl. Med. Res.* 1938. July. Vol. 26. No. 1. pp. 1–32. [12 refs.] [Summary appears also in *Bulletin of Hygiene.*]

The examination of water supplies for the type of vibrio present has a special bearing on the occurrence of vibrios in cholera stools other than typical *V. cholerae.* The authors practically insist that the typical *V. cholerae* is the vibrio which agglutinates with pure " O " serum of " O " group I (Gardner and Venkatraman). On the other hand " H " antigen may be possessed by many vibrios in common with *V. cholerae* so that agglutinability with Inaba " HO " serum may be due to this antigen and indicates that an " HO " serum is not satisfactory for the detection of the cholera vibrio. The investigation here reported was conducted to discover which were the vibrios found in water in parts of India not at the time visited by cholera. It takes into account likewise the cholera season by dividing the investigation into two parts: (1) Observations during the hot-weather and monsoon periods, and (2) Observations during the cold weather period. All types of vibrio of the Heiberg six groups were found although in very varying numbers. During the hot weather or monsoon the majority of the types belonged to Heiberg's groups I and II while in the cold weather vibrios from the same area belonged mainly to groups V and VI. Vibrios it has been found are " almost univerally present in unprotected wells, tanks and rivers in areas of Northern India where cholera is not endemic and their presence is in no way related to contamination from cholera sources." No isolated strain was agglutinable with pure " O " cholera serum, although " many of the strains showed ' O ' serological relationship with vibrios other than typical *V. cholerae* isolated from cases of clinical cholera and from carriers in Bengal and other parts of India." All these findings lead up to the deduction that vibrios other than typical *V. cholerae* isolated from cholera stools are probably water vibrios. " It is obvious," say the authors, " that with this almost universal distribution of vibrios in water, including waters which may be used for drinking purposes, vibrios must frequently obtain entrance to the intestinal tract of those using the water and the appearance of such vibrios in stools of healthy individuals or in cholera cases is to be expected." *W. F. H.*

PANDIT (S. R.) & MAITRA (N. M.). **Vibrios in Natural Water Sources in Assam.**—*Indian Jl. Med. Res.* 1938. July. Vol. 26. No. 1. pp. 39–40.

This short communication has reference to the vibrios isolated from open surface waters in Assam. The method used for isolation differed somewhat from other similar essays in that cultivation was carried out at a *p*H close upon 9·0. It was found that 33 strains isolated were monotrichate and 17 leptotrichate. A point worth noting is that *Bact. faecalis alkaligenes,* although giving the same fermentation reactions as the vibrios did not reduce nitrates or liquefy gelatin, and produced

alkalinity in milk. " No material difference was noted in the incidence of vibrios or in their characters during the cold-weather as compared with the hot-weather period." *W. F. H.*

PASRICHA (C. L.), CHATTERJEE (D. N.) & DAS (P. C.). **The Distribution and Characteristics of Vibrios isolated from Certain Non-Human Sources in Calcutta.**—*Indian Jl. Med. Res.* 1938. July. Vol. 26. No. 1. pp. 33–37.

This study deals with surface waters, tubed water supplies, flies and cockroaches as non-human sources of vibrios. It takes its importance from a well attested fact that " although the ' O ' inagglutinable vibrios are found in sewage or in polluted waters similar vibrios are occasionally found in the stools of cholera patients, carriers, or contacts and their presence sometimes causes confusion in making a bacteriological diagnosis." From this finding arises the question whether such inagglutinable vibrios may not be cholerigenic. By inagglutinability is meant non-agglutinability with pure " O " serum of the type group I of Gardner and Venkatraman, for naturally they do agglutinate with " O " serum produced by their own " O " type of antigen. The summary of the authors' findings from an investigation of 300 samples of surface waters, 320 flies and 94 cockroaches is comprised in the statements that : (1) " The vibrios isolated from different samples of water, from flies and cockroaches were all inagglutinable with Inaba ' O ' serum ", and (2) " Biochemically the majority of the strains of vibrios isolated belonged to Heiberg's types I and II and very few to the other types." *W. F. H.*

LAHIRI (M. N.) & DAS (P. C.). **Vibrios from Certain Non-Human Sources.** —*Indian Med. Gaz.* 1938. Nov. Vol. 73. No. 11. pp. 670–671.

These non-human sources were a variety of animals. " The results of the examination of single specimens show that, except for mules, mice and cats, vibrios are found in the stools of the majority of the animals." From the number of positive isolations and the percentages which are given it is possible to calculate the number of animals of each species dealt with. A total of 195 animals of 13 different species was examined. Seventy-five strains were examined in detail :—all were inagglutinable with " O " Inaba serum ; 33 were agglutinable to full titre with " H " + " O " serum ; grouped according to Heiberg 41 were of group I, 32 of group II, and one each of groups III and VI ; indole production was positive in 54 and 16 were haemolytic to sheep erythrocytes. " Bacteriophages active against the vibrios isolated from the animals were not found in a series of fifty stools. This, with the irregular isolation of vibrios from the stools of laboratory animals, suggests that vibrios are present in the stools of animals as contaminants." *W. F. H.*

VARDON (A. C.) & DATTA ROY (B. K.). **A Papain-Casein Culture Medium for the Preparation of Bacteriophage, and for General Laboratory Use.**—*Indian Jl. Med. Res.* 1938. Oct. Vol. 26. No. 2. pp. 379–392. [Summary appears also in *Bulletin of Hygiene.*]

Experiments were undertaken by the authors to find a cheap, unobjectionable, and satisfactory nutrient medium for general laboratory

use and for preparation of therapeutic bacteriophage. The papain-mutton routine medium was not altogether satisfactory for the purpose. They have prepared a papain-casein medium which answers all requirements. It is a medium in which the nitrogen content is represented mainly by proteose and peptone. Full details are given of the technique of preparation. The relative cost of Witte's peptone medium, papain-mutton broth and papain-casein broth is given as 39 : 13·5 : 4·6 respectively and the new medium is described as suitable for the growth of ordinary bacteria, delicate bacteria and bacteriophage. Much of the work was done with *V. cholerae* and cholera-dysentery bacteriophage, but *Bact. coli*, *Bact. typhosum*, *Bact. paratyphosum A* and *B*, streptococci, pneumococci and *N. gonorrhoeae* were also used.

W. F. H.

GENEVRAY (J.) & BRUNEAU (J.). Utilisation de l'eau peptonée hypersalée comme milieu d'isolement du vibrion cholérique. [**Hypersalted Peptone Water as Cholera Isolation Medium.**]—*C. R. Soc. Biol.* 1938. Vol. 129. No. 25. pp. 165–167.

It had been found that rapid and successive passages of culture from cholera stools were successful in the isolation of *V. cholerae*. Some disadvantages attached to the method because of the overgrowth of organisms like *Ps. pyocyanea* and *Proteus vulgaris*, especially when the stool sample arrived late in the day and the first culture obtained could not be dealt with till next morning. As an excess of salt such as 30–40 parts per 1,000 of peptone water did not inhibit the growth of the cholera vibrio, the method now adopted—and with success—is to make up the peptone water with 20 gm. peptone and 30 gm. salt to the 1,000 cc. distilled water and adjust to *p*H 8·5. Ordinarily the procedure adopted is, after sowing and an incubation of 6 hours at 37°C., to make a fresh sowing of one loop from the surface to nutrient agar and another to a tube of hypersalted peptone water. The next morning the agar tube is examined and fresh sowing made from an isolated colony. It may sometimes be necessary to sow again from the second peptone water tube to agar. *W. F. H.*

BANERJEE (D. N.). Culture du vibrion cholérique anaérobie, les variations de son *p*H et son pouvoir toxique. [**Anaerobic Culture of the Cholera Vibrio.**]—*C. R. Soc. Biol.* 1939. Vol. 130. No. 1. pp. 32–34.

It was found that the cholera vibrio grew luxuriantly under anaerobic conditions in glucose media. Changes in *pH* of the medium are well known and these occur for both aerobic and anaerobic cultures, whether ordinary or glucose media. In RAMON's glucose medium,* however, the *p*H does not change whatever the oxygen conditions and therefore this medium, with the addition of glucose, is the one to be preferred.

W. F. H.

* [No reference to RAMON's medium is given in this paper, but the following (RAMON, G., *C. R. Soc. Biol.*, 1933, Vol. 112, p. 8) is probably the medium used :—10 cc. HCl and 225 gm. fresh hog's stomach are digested at 45°C. for 2 hours. To this is then added 325 gm. veal finely minced, and the whole is well mixed. After 20–22 hours digestion is stopped by heating to 80–100°C., and the mixture is strained. The liquid is brought to *p*H 8 by means of soda lye and subsequently heated to 100°C. for 20 minutes, filtered and autoclaved. Glucose (1·5 to 2 gm. per litre) and sodium acetate (5 to 10 gm. per litre) are added after sterilization.]

DeMonte (A. J. H.) & Gupta (S. K.). **Blood Culture in Cholera.**—*Indian Med. Gaz.* 1938. Nov. Vol. 73. No. 11. p. 670.

Blood cultures were made on 26 cholera patients and in 20 of these within 9 hours of the onset of symptoms. In no case was the cholera vibrio isolated. *W. F. H.*

Pasricha (C. L.), DeMonte (A. J. H.) & Chatterjee (B. C.). *Vibrio cholerae* **from Material obtained by Liver Puncture during Life.**—*Indian Med. Gaz.* 1938. July. Vol. 73. No. 7. pp. 405–406.

In life cholera vibrios are capable of isolation from stools, vomit or urine, but no record exists of recovery from the liver. This has been done by the authors. A boy of 7 years developed cholera and on the third day complained of pain on the right side of the abdomen. An icteroid tinge was present in the conjunctivae, which deepened into jaundice. By the seventh day he had become worse and "liver dulness extended to below the umbilicus." Liver puncture was done and the few drops of blood obtained were inoculated into peptone water. The patient improved after the puncture and was well in about 14 days. Typical O-agglutinable smooth cholera vibrios had been isolated from the stools but not from the blood or urine. The liver puncture material gave a positive culture and, again, O-agglutinable cholera vibrios were obtained with all the same characteristics, biochemical, serological and bacteriophagic, as vibrios obtained from the stools. *W. F. H.*

Chatterjee (D. N.) & Malik (K. S.). **The Bacteriological Examination and the Hydrogen-Ion Concentration of the Urine of a Series of 122 Cholera Patients.**—*Indian. Med. Gaz.* 1938. Oct. Vol. 73. No. 10. pp. 612–613.

No cholera vibrios were isolated from the urine of patients. The urine of 50 bacteriologically-proven cholera patients was found to be of *p*H 4·4 to 5·4 during the acute stage of the disease and to become normal with the subsidence of acute symptoms. *W. F. H.*

Chatterjee (B. C.). **Cholera: its Diagnosis and Treatment.**—*Calcutta Med. Jl.* 1938. Dec. Vol. 34. No. 6. pp. 508–528.

Otsubo (G.). Réaction d'agglutination des sérums immunisés par l'antigène "O" de vibrion cholérique, au point de vue du diagnostic. [**Immune Sera from Antigen "O" in the Diagnosis of Cholera.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. July. Vol. 30. No. 7. pp. 1506–1509.

Ghosh (H.). *B. pyocyaneus* **Infection simulating Cholera and Acute Dysentery.**—*Jl. Indian Med. Assoc.* 1938. Sept. Vol. 7. No. 12. pp. 655–656.

Several patients were admitted to hospital with typical symptoms of cholera and blood in the stools. In the cultures of the stools made from 7 patients *Ps. pyocyanea* was found in five and no cholera vibrios.

The organism too was highly virulent for the rabbit in a dose of 0·25 cc. of 22-hour broth culture. The author recollects a number of cases in the past with dysenteric symptoms in which *Ps. pyocyanea* was isolated. *W. F. H.*

MASSIAS (Charles). A propos du traitement du choléra. Les injections intraveineuses de solution chlorurée hypertonique à 20%. [**Intravenous Injection of 20 Per Cent. Hypertonic Saline in Cholera.**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. Feb. Vol. 16. No. 2. pp. 131–134. [26 refs.]

Many of the grave features of cholera are due to hypochloraemia. Chloropenia, in fact, is a more important symptom than dehydration. With this foundation to go on the author has made a practice of injecting as a matter of urgency 20 per cent. sodium chloride intravenously in cholera. The dose has been 20 cc. and is repeated 12 hours later if necessary. In this way the loss of salt, which has taken place through vomiting and diarrhoea, is restored and so is diuresis. Mortality has been lowered to 22 per cent. It is possible that a 10 per cent. solution of salt may be a better concentration than 20 per cent. and, certainly, a 30 per cent. concentration is harmful by producing tachypnoea and arterial hypertension. *W. F. H.*

THOMAS (Harold) & TING (Lih-cheng). **Innocuous Intravenous Infusion with an Appeal for the Establishment of Central Solution Laboratories for Cholera Relief.**—*Chinese Med. Jl.* 1938. Oct. Vol. 54. No. 4. pp. 358–366. With 1 fig. [13 refs.]

Although dramatic results follow the administration intravenously of saline solution to cholera patients and to dehydrated patients suffering from dysentery and typhoid, these are apt to be temporary and to be followed by dangerous symptoms. In fact the mortality among those receiving a saline injection might be higher than among those who do not. Experimental work has shown that these symptoms are due to pyrogenic substances in the distilled water used. The distilled water must be pure and must be maintained pure and ready for use. Four principles are to be followed in distillation :—" (*a*) Discard the first run of the distillate for a period of 15 minutes. (*b*) Distill slowly to avoid foaming. (*c*) Deconcentrate rapidly. (*d*) Cleanse still every six months." Other instructions are that no delay must occur over sterilization of the distillate which should be collected directly into glass- or enamel-ware containers. Sterilization of the distillate must take place as quickly as possible and not later than three hours. All tubing needles and glassware which are used for the operation of injection are cleansed with green soap solution and distilled water ; here also sterilization must be carried out within three hours. Only chemically pure salt and glucose are used in making up injection solutions. These precautions, while simple enough, cannot be too carefully carried out.

It is stated that, with the technique adopted, " 570 intravenous infusions of saline and glucose have been given . . . with not a single untoward reaction." An important and reasonable recommendation is made that :—" Hospitals and Municipalities during cholera epidemics should cooperate for the preparation and wholesale distribution from

a central laboratory of fresh distilled water; freshly distilled and sterilized water or better the saline or glucose solutions ready for infusion." *W. F. H.*

BANERJEE (D. N.). Reaktion nach Salzlösunginfusionen bei Cholera. [**Reaction after Saline Injection in Cholera.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1938. Dec. Vol. 42. No. 12. pp. 543-547.

As a consequence of the intravenous injection of salt solution in cholera patients a rigor is a very common (81 per cent.) result and it may be slight, moderate, or severe. The experience of the author was gained from 1,714 injections in 1,000 cholera patients and the principle followed was to regulate the injection so that its temperature should be as much above 36·7°C. (98°F.) as the rectal temperature was below it. Usually 1 pint of alkaline isotonic solution (sod. chloride 90 grs.; sod. bicarbonate 160 grs.; freshly sterilized tap water 1 pint) was given first, followed by 1 to 6 pints of ordinary normal or hypertonic salt solution (sod. chloride 120 grs.; calc. chloride 4 grs.; freshly sterilized tap water 1 pint) according to the indication given by the specific gravity of the blood. A considerable number of the patients also received 25 to 50 cc. of a 25 per cent. glucose solution. It was found advisable before beginning the saline injection to reduce the high rectal temperature by an enema of 15 to 20 ounces of ice-cooled normal salt solution, as in this way the reaction appeared to be diminished in intensity. *W. F. H.*

OMAR (Wasfy). **The Bacteriophage in the Treatment and Prophylaxis of Cholera.**—*Jl. Egyptian Med. Assoc.* 1938. Aug. Vol. 21. No. 8. pp. 491–501. [21 refs.]

CHATTERJEE (S. K.) & DEO (L. R. S.). **Some Factors controlling the Activity of Bacteriophage and the Method of filling Medicinal Phials with Bacteriophage Suspension as practised in the Bacteriophage Laboratory, Government of Bihar.**—*Jl. Indian Med. Assoc.* 1938. Dec. Vol. 8. No. 3. pp. 141–144.

Treatment to be effective in a disease like cholera must be rapid and consequently the bacteriophage to be used in cholera therapy must be of quick acting type. It is on this account that the dominant phage used is of the A type, which has a generation period of under one hour. Freshly isolated A phages are very unstable and have to be adapted to laboratory conditions and to as many strains of smooth vibrios as possible. It is this phage which can be separated in a large proportion of convalescents and this is held to be an indication that it is the phage "mainly concerned in bringing about the cure of the patients." An endeavour should be made however to combine other choleraphages with the A phage and indeed "the phage mixture issued for therapeutic purposes should contain all available types of phage." A very essential point in choleraphage therapy is also its administration "in massive doses at the earliest opportunity." It may be used up to 9 months after preparation.

A filling process is described in which filtration of phage suspension and filling of medicinal phials are all done in one operation instead of two. *W. F. H.*

SMITH (H. F.). Revue des mesures adoptées pour empêcher l'introduction du choléra dans les îles Philippines en 1937. [**Prevention of Cholera in the Philippines in 1937.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. July. Vol. 30. No. 7. pp. 1524–1545. With 6 figs. on 1 plate.

Cholera has ravaged the Philippines in the past and the stringent regulations now adopted can claim to have eliminated practically all danger of entry of the disease by sea. In 1902 there were notified 13,755 deaths from cholera and in 1903 there were 62,843. This state of affairs continued up to 1909 with variations from 472 to 28,866 deaths yearly. Since 1910 there have been accidental epidemics but none has attained the proportions of the earlier years. With the exception of one case in 1935 and one in 1937, the Philippines have had no cholera since the beginning of 1934. There is very direct and constant communication between Manila and Hong Kong, which are distant only 36 to 48 hours by sea, so that the result attained is obviously due to the measures adopted for prevention of cholera entry by passengers or crew. Great attention is paid to avoidance of undue, or indeed any, delay to ships in taking or discharging cargo and such delay as is suffered by passengers who are suspect is made as pleasant as possible. The article consists of a description in most minute detail of how passengers and sailors are examined, how stools are obtained for examination and how the individuals concerned are identified with certainty. A study of this detail will be of great use to those engaged in the same practice or who propose to put similar procedure into operation. It is well to note that " in the Philippines the needs of quarantine demand that the discovery of the cholera vibrio in the stools, whether agglutinable or not, suffices to label the person who has furnished the stool a carrier and to justify his isolation and his treatment." *W. F. H.*

WAHBI (Suhbi). Rapport bactério-parasitologique sur l'examen des pèlerins au laboratoire de la quarantaine à Najaf (février-mars 1938). [**Examination of Pilgrims at Najaf.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Nov. Vol. 30. No. 11. pp. 2531–2533.

The route across the desert from Irak to Mecca is important because it is the shortest for pilgrims from Afghanistan, Iran and Irak, and, moreover, gives the pilgrim an opportunity of visiting the holy places of Najaf and Karbala. Arrangements have been made for quarantine of returning pilgrims at Rabha near the Irak frontier and laboratory examination directed from Najaf. An El Tor vibrio has already been isolated and a considerable infection with pathogenic intestinal protozoa and helminths demonstrated among pilgrims. *W. F. H.*

FEDERATED MALAY STATES. ANNUAL REPORT OF THE INSTITUTE FOR MEDICAL RESEARCH FOR THE YEAR 1937 [KINGSBURY (A. Neave), Director]. [**Cholera** pp. 14–19. GREEN (R.).]

A striking testimony to the efficiency of the Federated Malay States quarantine service is the simple fact that no cases of cholera have occurred in the territory during the past ten years. Four cases were caught at Port Swettenham where there is quarantine accommodation for 2,000 persons. The strains of cholera vibrio used in the preparation of vaccine at the Institute for Medical Research of the Federated

Malay States are four. This vaccine contains " Inaba " and " Ogawa " sub-types in approximately equal proportions with the idea of providing the various antigens required to produce a satisfactory immunization response. *W. F. H.*

YÜ (H.). **The Virulence and Immunogenic Activities of *V. cholerae* in the Preparation of Cholera Vaccine.**—*Chinese Med. Jl.* 1938. Sept. Vol. 54. No. 3. pp. 255–258.

The strains of *V. cholerae* used in this investigation were 37 isolated in Shanghai in 1932, 36 in 1936, and the Lister Institute strain. A conclusion is reached from experiments on mice that the " smooth strains of *V. cholerae* vary in virulence and protecting capacity." Cultures used in the preparation of cholera vaccine should be selected because of their high virulence in animal test. *W. F. H.*

PASRICHA (C. L.), CHATTERJEE (D. N.) & PAUL (B. M.). **Studies on the Potency of Prophylactic Vaccines. I. Cholera Vaccine.**—*Indian Med. Gaz.* 1938. Aug. Vol. 73. No. 8. pp. 463–465.

Cholera vaccines as used in India are of three main sources : recognized laboratories, local commercial firms and foreign. Fourteen examples of vaccines were examined for (1) sterility, (2) freedom from abnormal toxicity, (3) antigenic response in rabbits, (4) antigenic response in man and (5) protective value in guineapigs. It was found that :—(*a*) All the vaccines were sterile and free from abnormal toxicity. (*b*) All the six cholera vaccines from recognized laboratories " gave satisfactory antigenic response and protected guineapigs against 2 M.L.D. of *V. cholerae*." (*c*) " Four of the eight commercial preparations of cholera vaccines produced cholera agglutinins and possessed protective properties, and four vaccines gave uniformly negative results." *W. F. H.*

CARO. L'épidémie de choléra de 1937 à Haiphong. Les enseignements de la campagne de vaccination. [**Vaccination at Haiphong in the Cholera Epidemic of 1937.**]—*Ann. de Méd. et de Pharm. Colon.* 1938. July–Aug.–Sept. Vol. 36. No. 3. pp. 726–731.

Recorded deaths and cases seem to show that the cholera epidemic of 1937 which visited Haiphong was one of the most severe of recent years. Some of its severity may be traced to the incursion of refugees. A remarkable effort was made by the authorities to apply anti-cholera vaccination on a large scale in record time to counter the menace. This vaccination began on 23rd September and had been carried through for 94,000 individuals by 3rd October. A total of 158,000 individuals was ultimately reached. The dose administered was single and consisted of 1,200 million organisms, being designed to bring about rapid immunization of a large number of persons. Ten days after the 3rd October the curve of daily cases steadily decreased by lysis. An examination of 546 patients admitted to hospital showed that 94 per cent. had not been vaccinated. Still another testimony to the value of the vaccine in cutting short the epidemic was the fact that in Haiphong where the vaccination had been rapid and on a large scale, it was extinguished although it continued to prevail throughout the Tonking

delta for long after. No evidence of any influence exerted by vaccination to mitigate the severity of the attack in the individual could be obtained. *W. F. H.*

QUENARDEL. Vaccination anticholérique. [**Anti-cholera Vaccination.**] —*Rev. Méd. Française d'Extrême-Orient.* 1938. Apr. Vol. 17. No. 4. pp. 416–425.

There is abundant evidence that in Tonking a very active campaign of vaccination against cholera was undertaken, for 6,500,000 inoculations were performed in the short space of 4 months.

Many reports were received of the efficiency of the vaccination procedure but these reports were by no means all favourable. *W. F. H.*

MALARIA.

Précis of Abstracts in this Section.

Mackay (p. 387) shows that in Dar-es-Salaam *A. gambiae* flourishes in the rainy season and *A. funestus* in the dry, and that both are important in transmission, which is therefore continuous. Carriers on the outskirts of the town form a permanent reservoir of infection.

Busch (p. 388) gives information on malaria in the German navy during the war.

Parrot and Catanei (p. 388) show that premunition is established in Algiers about the tenth year of age. It is more ephemeral in *P. falciparum* infections than in the others and excessive prevalence of vectors causes violent *P. falciparum* epidemics from time to time partly because of the disappearance of premunition to that species. Lefebvre (p. 389) reports that malaria in Laos is endemic and shows little variation from season to season. Epidemics are practically unknown. *P. falciparum* is the commonest parasite and *A. minimus* the most important vector.

Christophers and Sinton (p. 390), enquiring into the history of the nomenclature of malaria parasites, show that the common names *P. vivax, P. malariae* and *P. falciparum* are justified.

Ciuca *et al.* (p. 390) from studies of 3 strains of *P. vivax* conclude that individuals in Rumania are more susceptible to an imported strain than to one of local origin, and if infected with a local strain, possess a relative immunity towards an imported strain. Maintenance of a local strain in a non-endemic country did not bring about any change in it.

Missiroli (p. 391) recounts the effect of the different races of *A. maculipennis* on the epidemiology of malaria. Toumanoff (p. 391) found that the interval between feeding and egg-laying of *A. hyrcanus* var. *sinensis* varies between 12 and 100 days in winter, and is about 9 days in the hot weather. He has (p. 391) succeeded in carrying this mosquito through two generations in the laboratory.

Cicchitto (p. 392) found a high degree of reticulocytosis in malaria, especially in malarial anaemias. Carrot and Fabiani (p. 392) describe a patient who died with an acute jaundice syndrome. Subperitoneal haemorrhages were found in the upper abdomen and the syndrome was ascribed to malaria. Green (p. 392) describes malaria in 3 infants diagnosed by blood examination within two days of birth, and Measham (p. 393) one in whom the blood was positive 17 days after birth in the non-transmission season.

Shute and Badenski (p. 393) stress the importance of the diagnosis of the species of infecting Plasmodium and of aborting induced primary attacks of *P. falciparum* malaria at about the tenth day. A single negative blood film is not enough to exclude the diagnosis of malaria.

Trensz (p. 394) describes Henry's reaction and Chorine (p. 394) shows that flocculation in distilled water closely resembles melano-flocculation. Melanin is merely an indicator and can be replaced by other substances. The reaction only becomes positive when the euglobulins form 32 per cent. of total serum proteins. The degree of dilution or concentration of hydrogen ions is the determining factor. The reaction has undeniable clinical value. Sicault and Messerlin (p. 395) describe a method to determine the maximum dilution which gives a positive reaction. Azzi and Del Frade (p. 395) found that serum from

non-syphilitic infants suffering from malaria may give positive serological tests for syphilis.

SINTON (p. 396) records the action of atebrin upon gametocytes of *P. falciparum.* DE MELLO (p. 396) and also CHOPRA (p. 396) review the drugs used in malaria. GORE (p. 396) considers cinchona febrifuge more effective than quinine, and GUEST (p. 397) found Malarene to be less so.

LUCHERINI (p. 397) describes a patient suffering from chronic malaria who developed haemoglobinuria after taking atebrin, but further treatment with atebrin produced no ill effects. LIVADAS *et al.* (p. 397) compared quinine, atebrin and plasmoquine in treatment and conclude that the combinations of atebrin and plasmoquine and of quinine and plasmoquine have special advantages. CHOREMIS and SPILIOPOULOS (p. 398) record cases of temporary laryngeal and peripheral paralysis in children after the administration of atebrin or plasmoquine, which are therefore neurotropic and should be given in courses not exceeding five days.

After testing mapharsen in the treatment of induced *P. vivax* malaria, GOLDMAN (p. 398) concludes that it is the drug of choice, being as effective as atebrin, easy to administer and safe. It has not been tested in *P. falciparum* infections.

NIVEN (p. 399) tested sulphanilamide in the three malarial infections but found it to be much less efficient than quinine, and much more costly, but SORLEY and CURRIE (p. 400) found it useful in *P. vivax* infections, especially if followed by atebrin.

PIZZILLO (p. 400) draws attention to the substantial identity of the mechanism of Ascoli's treatment and of natural climatic therapy, and (p. 400) describes there activations which occur after the completion of the Ascoli method of treatment. The late febrile manifestations differ from relapses in that recovery is spontaneous and the interval between the end of treatment and the onset of the reactivation attack varies inversely with the duration of infection.

SINTON *et al.* (p. 401) found that Certuna failed to prevent infection with *P. falciparum* in experiments on five patients.

The Malaria Commission of the Council of Public Health of Holland (p. 401) conclude that a therapeutic campaign is not at present practical. The killing of all Anopheles in summer and autumn should reduce malaria in the following year to one-fifth of its ordinary frequency, but spraying with Shelltox should be performed every 14 days. This method is costly. As *A. maculipennis atroparvus* prefers water containing 1,500 mgm. chlorine per litre to lower concentrations, the change of the Ijsselmeer from salt water to sweet water will eliminate breeding places of this vector.

STROTHER-SMITH (p. 403) reports that the emptying of all water receptacles, including tanks and irrigation ditches, from 6 a.m. to 9 a.m. on one day each week, and the cleaning of the edges of larger collections of water, has markedly diminished the prevalence of mosquitoes in certain cantonments in Northern India. MICHELSON (p. 403) describes a method, depending upon a gunny screen supplied with oil by means of a wick, for the continuous oiling of streams. KING (p. 403) found phenothiazine in sulphonated petroleum oil and acetone to be an efficient Culex larvicide in the laboratory.

BRUMPT (p. 404) considers that foreign bodies in the tissues of mosquitoes are liable to undergo chitinization, and oöcysts and sporozoites are no exception to this rule, and chitin may be deposited

round groups of the latter. The presence of black spores of the type associated with malarial infection is an indication that infection has occurred.

COGGESHALL and EATON (p. 404) have prepared antigens from blood and spleen of infected monkeys, which give complement fixation reactions with the serum of infected animals. Protective antibodies and complement fixing antibodies are probably distinct. EATON (p. 405) shows that in monkeys infected with *P. knowlesi* agglutinins appear between the 15th and 45th day which are specific for that species and act only on mature parasites. COGGESHALL and EATON (p. 405) show that in monkeys the interval between infection and appearance of parasites varies with the number of parasites injected, but the severity of the disease does not. Serum from chronically infected monkeys will protect against death if suitably administered, and the optimum protection is obtained with serum from monkeys superinfected seven times during the course of two months (COGGESHALL and KUMM, p. 406). *C. W.*

COLONIAL DEVELOPMENT FUND (MALARIAL RESEARCH SCHEME). **Second (Final) Report of the Malaria Unit, Dar-es-Salaam, for the Period November 1934 to December 1936** [MACKAY (R.), Malaria Research Officer, Tanganyika Territory].—61 pp. With 10 charts, 2 maps, 4 plans, 1 histogram & 22 figs. on 6 plates. 1938. Dar-es-Salaam: Govt. Printer. [5s.]

The first report of the Dar-es-Salaam Malaria Unit was abstracted in this *Bulletin*, 1936, Vol. 33, p. 225. This final report completes the narrative.

The local species of *Anopheles* are, *gambiae*, *funestus*, *maculipalpis*, *squamosus*, *mauritianus* (and var. *tenebrosus*), *marshalli*, *gambiae* var. *melas* and *nili*. Only the first two are important vectors; some of the others have been caught in houses but none has been found infected. There is a retarding of the parasite development rate in Anopheles and a decrease in the number infected during the dry season. The average infection rates for three years 1934–36 were *A. gambiae*, oöcysts 2·15, sporozoites 3·46 per cent.; *A. funestus*, oöcysts 0·83, sporozoites 2·76 per cent. The numbers of Anopheles dissected were, *gambiae* 18,511 and *funestus* 19,055. *A. funestus* is as important as *A. gambiae* in the local transmission of malaria. The *gambiae* infection rate curve follows the rainfall curve; *funestus* flourishes best in the dry season. Thus malaria transmission goes on almost without remission. *A. gambiae* breeds in road puddles, hoof-marks, gravel pits, and in similar small collections of water. It is a more urban species than *funestus*, which breeds in grass-protected still water with varying degrees of shade. Examination of the *p*H of water of breeding places of the two species showed that *p*H 7·6–8·0 was most common. *A. gambiae* var. *melas* was found breeding in water with a saline content as high as 3,267 parts NaCl per hundred thousand: it has not been found infected.

Mean spleen rates for ages 0 to 5 were 88·2 and for ages 6 to 10, 79·4 per cent., which are indicative of very early infestation. The infection rate is fairly constant throughout the year. The trend of the graph showing the number of parasites per cubic millimetre of blood follows closely that of the infection rate of Anopheles.

The anti-malarial measures that have been, or are being, taken, are fully described. Human carriers living on the outskirts of the

town are a permanent reservoir of infection for Anopheles breeding in the vicinity, and thus intensify the infection of those living on the periphery of the controlled area. A protective zone free from uncontrolled dwellings is advocated. Attention is given to man-made Anopheles breeding-places and to how these should be avoided. Appendices reproduce the text of local legislation for the control of malaria, and specimen copies of propaganda pamphlets.

This report together with its predecessor forms a very informing record of an unusually complete malaria survey. *Norman White.*

BUSCH (Hans-Gerhard). Die Malaria in der Geschichte der Völker. [**Malaria in the History of Populations.**]—Reprinted from *Veröffentlichungen a.d. Gebiete des Marine-Sanitätswesens.* 1938. No. 30. pp. 93–146. [89 refs.]

This is a thesis submitted for the degree of doctor of medicine by the author, who qualified in 1937 and is now in the German navy. It is an interesting study of the literature of the subject. Some of the statistical data which he gives regarding malaria in the great war are taken from the official reports and are of considerable interest. Thus in the five years of war, 1,056,848 men were mobilized in the German navy. Of this number, 1,872, 1·77 per mille, were attacked by malaria, including blackwater fever. Of the 1,872, 1,844 were returned fit for service, 9 died, 1 was partially unfit for service. He considers that the small number of cases in the navy can be attributed to the special skill of German naval medical officers. He gives the following comparative table of malarial morbidity and mortality in Macedonia quoted from Ziemann :—

	In the British Army			In the German Army		
	Attacked		Died	Attacked		Died
	Number	0/00	0/00	Number	0/00	0/00
1916 ...	32,018	259·5	2·3	5,004	53·6	0·91
1917 ...	71,412	391·1	1·3	16,672	141·2	0·92
1918 ...	59,087	458·9	2·1	—	—	—

E. D. W. Greig.

PARROT (Louis) & CATANEI (Antoine). Sur les facteurs d'apparition des épidémies de paludisme en Algérie. [**The Factors determining Epidemic Malaria in Algeria.**]—*C. R. Acad. Sci.* 1938. Nov. 2. Vol. 207. No. 18. pp. 809–811.

Exceptional circumstances enabled the authors to study the natural evolution of *falciparum*, *vivax* and *malariae* infections in a population of 1,878 Berbers, very highly infected, without medical assistance, and temporarily protected from reinfection. Abnormally frequent and violent rainstorms prevented the formation of anopheline breeding places throughout the transmission season. Blood examinations of the entire population were made monthly, or bi-monthly, for 14 months.

Malarial infections were twice as frequent below the age of 15 as above that age. At all ages *P. falciparum* was most in evidence.

Between the ages of 11 and 15 the frequency of *falciparum* decreased about a third ; of *vivax* about a half, and of *malariae* about four-fifths. Above the age of 15 up to 50 the index of infection for all three species remained fairly constant. In all infected persons parasites were scanty in the peripheral blood, especially in adolescents and adults. Gametocyte carriers were 5 per cent. of *falciparum* infected ; 42·8 per cent. of *vivax*, and 63·6 per cent. of *malariae*.

These observations tend to confirm the observations of Edm. SERGENT that premunition is established among the infected population of Algeria about the 10th year. It is less complete, less early and more ephemeral in the case of *falciparum* infections than in those of *malariae* and *vivax*. The proportion of gametocyte carriers among the infected by the three species indicates that old cases of *vivax* and *malariae* constitute in Algeria more important reservoirs of endemic malaria infection than do old cases of *falciparum*. It is but rarely that *vivax* and *malariae* occasion violent epidemics : premunition against these species is more lasting. Excessive prevalence of anopheline vectors causes from time to time violent *falciparum* epidemics partly because the premunition acquired in the previous epidemic has in large part disappeared. *N. W.*

LEFEBVRE. Recherches sur le paludisme au Laos. [**Investigation of Malaria in Laos.**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. Apr. Vol. 17. No. 4. pp. 336–354. With 3 graphs.

Reports have appeared from time to time regarding the prevalence of malaria in different parts of Laos but this is the first comprehensive report dealing with malaria conditions in Laos as a whole. Laos is a territory about half the size of France : it forms a strip, in parts a narrow strip, of country running north–south, between Annam, the frontier with which is formed by a high mountain chain, and the river Mekong which bounds it on the west. The widest, northern, part of the country is very mountainous. The only low-lying area is found in the valley of the Mekong ; this narrow strip of flat land consists of rice fields and cleared forest. It is the most densely populated area. The rainy season is from mid-April to the beginning of October. The total annual rainfall varies from 1·70 to 3·70 metres according to locality.

With the exception of certain centres on the banks of the Mekong, where malaria is little if at all endemic, the rest of the country is severely infected. Very severe forms of the disease are encountered but these affect for the most part new arrivals. Judging from hospital returns the disease is most prevalent in the rains, but the disease among the indigenous population is characterized by chronicity, prevailing everywhere without intermission and with but little variation from season to season, or from year to year. Epidemics of malaria are practically unknown. The spleen index of children from 2 to 12 years of age is 59 per cent., and the parasite index 43 per cent. These are average rates for children from all parts. In some of the mountainous regions spleen and parasite rates from 60 to 90 per cent. have been recorded. Excluding hospital cases, parasites found were *falciparum* 63·9, *vivax* 20·4, and *malariae* 15·7 per cent. Splenic enlargement is less pronounced among *vivax* carriers than among *falciparum* and *malariae* carriers. Eighteen species of anophelines were found. *A. minimus* is the most important vector. Thanks to the

adaptability of its larval form this species persists throughout the year. In some localities and at certain seasons *A. maculatus*, *A. jeyporiensis* and *A. leucosphyrus* are effective vectors. Malaria is the most important cause of sickness and death in Laos. *N. W.*

CHRISTOPHERS (Rickard) & SINTON (J. A.). **The Correct Name of the Malignant Tertian Malaria Parasite.**—*Brit. Med. Jl.* 1938. Dec. 3. pp. 1130–1134. [32 refs.]

The authors of this informing contribution explain the causes and origins of the confusion attendant upon the multiplicity of names that have been bestowed upon the parasite of malignant tertian malaria. *Plasmodium falciparum* is now more generally adopted than it was a few years ago but there are authors who persist in calling the parasite *P. praecox*, and some, *P. immaculatum*. Uniformity is greatly to be desired. The account given of the earliest published descriptions of the three malaria parasites is of great interest. It explains why the *de jure* nomenclature of the parasites of benign tertian, quartan and malignant tertian malaria, *viz.*, *Oscillaria vivax* (Grassi and Feletti), *O. quartana* (Celli and Sanfelice) and *O. malariae* (Laveran) was never generally adopted and how an opinion of the International Commission of Zoological Nomenclature justifies the adoption of the names now most commonly used, *viz.*, *Plasmodium vivax* (Grassi and Feletti), *P. malariae* (Grassi and Feletti) and *P. falciparum* (Welch). *N. W.*

CIUCA (M.), BALLIF (L.), CHELARESCO (M.) & LAVRINENKO (N.). Contributions à l'étude de l'infection expérimentale au *Plasmodium vivax*. (Etude comparée de trois souches du parasite.) [**Experimental Infection with** *P. vivax*. **Comparative Study of Three Strains of the Parasite.**]—*Arch. Roumaines Path. Expérim. et Microbiol.* 1937. Sept. Vol. 10. No. 3. pp. 217–265. With 18 graphs.

Working in Rumania the author has investigated during a number of years three strains of *Plasmodium vivax* in their passage through series of paralytics. Two of these strains were of local origin while one was an imported one, the "Madagascar" strain from Horton in England, where it had been maintained for some years. In these studies one of the local strains was sent to Horton, where it was maintained in paralytics for two years. It was then sent back to Rumania. Similarly the "Madagascar" Horton strain yielded another line after it had been kept for some time in Holland, again at Horton and finally in Rumania. The object of these transfers was to discover if there was any difference between the influence of a malarial and a non-malarial country. The various passages, amounting to many hundreds, were effected mostly by blood inoculations, but from time to time mosquito transmissions were effected.

The studies involved a careful morphological investigation of the strains at different stages and a detailed analysis of the case records of each patient from the point of view of incubation period, duration and height of fever, tendency to spontaneous recovery, response to drug treatment and the many other characters which may be grouped under the heading of biological features. The paper is a long one and contains numerous protocols which will have to be studied in detail by those who wish to weigh the evidence on which the conclusions

are based. They are these: The individuals inoculated are more susceptible to an imported strain than to one of local origin. The maintenance of a local strain in a non-endemic country did not bring about any change in the strain. Individuals who have been infected with a local strain have a relative immunity towards an imported strain. As regards their response to drug treatment it was not possible to distinguish between imported and local strains. *C. M. Wenyon.*

MISSIROLI (A.). **Varieties of *Anopheles maculipennis* and the Malaria Problem in Italy.**—Internat. Congress of Entomology, Berlin, 15th–20th Aug., 1938. With 6 figs. on 1 plate, 2 maps & 1 graph.

The author retells the story of the observations and investigations that led to the identification of the different races or varieties of *A. maculipennis* and shows how the geographical distribution of these varieties, with their differing biological characteristics, explains the vagaries of malaria distribution in Italy. The author's own contributions to these observations have been important. The paper is interesting but contains nothing that has not been previously published and duly noted in this *Bulletin*. *N. W.*

TOUMANOFF (C.). Au sujet de l'asthénie observée chez les femelles de *A. hyrcanus* var. *sinensis* du Tonkin pendant la période hivernale, et de ses conséquences probables dans la transmission du paludisme. [**On the Retarded Winter Development ("Asthenia") in Female *A. hyrcanus* in Tonking, and on the Relation of this to the Transmission of Malaria by this Insect.**]—*Bull. Soc. Path. Exot.* 1938. Oct. 12. Vol. 31. No. 8. pp. 733–736.

In Tonking, *Anopheles hyrcanus* var. *sinensis* does not actually hibernate, but the interval between feeding and egg-laying becomes greatly extended in winter. It may, apparently, range from about 12 days to over 100, the period in the hot weather being about 9 days. At the cold time of the year the females, which are to some extent domestic, feed readily, which may give the species considerable importance locally as a vector of malaria: the author develops the parallel between this species and *A. maculipennis atroparvus* of Holland. In certain other species of mosquitoes which have been studied in Tonking the effect of winter in retarding the development of ovaries is not so great as it is in *hyrcanus*. *P. A. Buxton.*

TOUMANOFF (C.). Les résultats de l'essai d'élevage au laboratoire de *A. hyrcanus* var. *sinensis* Wied. [**Rearing *A. hyrcanus* var. *sinensis* in the Laboratory.**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. Apr. Vol. 17. No. 4. pp. 355–364. With 4 figs. [19 refs.]

Anopheles hyrcanus var. *sinensis* has been carried through two generations in the laboratory. Some difficulty was encountered, for a large proportion of the females which emerged failed to become fertilized. The total number of species of Anopheles which have been bred successfully in the laboratory is still few. [See also this *Bulletin*, 1938, Vol. 35, p. 194.]

The author also discusses what is known at present about the structure of the surface of the egg of this species. It is already known that this species produces eggs of several different types, but whether the differences are genetic or due to environment is not known.

The paper contains a discourse on the views of ROUBAUD about stenogamy, which is consistently mis-spelt sthenogamy.

P. A. Buxton.

CICCHITTO (Angelo M.). Reticolociti e infezione malarica. [**Reticulocytosis and Malarial Infections.**]—*Riv. di Malariologia.* Sez. I. 1938. Vol. 17. No. 4. pp. 262–267. French summary.

A study of eighteen cases of malaria in the tropics, with special reference to reticulocytes, led to the following conclusions. A moderate or high degree of reticulocytosis is observed in malarial infections, and is most marked in malarial anaemias. There appears to be no relationship between the degree of reticulocytosis and the species of malaria parasite, but the former does vary directly with the degree of malarial anaemia, and also with the splenic index in primary infections. In cases of malarial haemolytic jaundice reticulocytosis is well marked and persists until recovery is complete. Specific treatment brings the number of reticulocytes within normal limits *pari passu* with the return of the blood to normal. *N. W.*

CARROT & FABIANI (G.). Syndrome douloureux abdominal palustre. [**Painful Abdominal Syndrome in Malaria.**]—*Bull. Soc. Path. Exot.* 1938. Nov. 9. Vol. 31. No. 9. pp. 841–843.

An Algerian aged 21 suffered from chronic malaria of long standing. He was admitted to hospital with the symptoms of acute appendicitis and was submitted to operation. The appendix appeared to be practically normal. Three months later he was once more admitted to hospital suffering from abdominal pain, diarrhoea, vomiting and fever. Schizonts of *falciparum* were found in the blood. He was treated with quinacrine; the temperature fell and the symptoms improved. A week after the beginning of the attack fever returned; bilious vomiting and jaundice appeared. The abdomen was very painful and there was marked rigidity in the epigastric region; scanty urine, albuminuria, blood urea 0·95, and very numerous parasites in the blood. Quinine was given intramuscularly and intravenously. The patient died. Post-mortem examination showed enlarged liver and spleen. There were small sub-peritoneal haemorrhages, either discrete or in patches more or less circular and measuring several centimetres across. These haemorrhages were confined to the upper part of the abdomen. Most were in the submesocolon, chiefly in the cavity behind the omentum, or near the base of the omentum along the course of the great mesenteric artery. The mesenteric glands were slightly enlarged. There was no perivisceritis.

The patient thus died with an acute jaundice syndrome. The pain and the lesions were both confined to the upper part of the abdomen. It would seem then that an acute malarial abdominal syndrome can be caused by sub-peritoneal haemorrhages. The authors are tempted to postulate an involvement of the sympathetic nervous system in this case. *N. W.*

GREEN (J. G.). **Three Cases of Subtertian Malaria in the Newborn.**—*West African Med. Jl.* 1938. Oct. Vol. 10. No. 1. p. 42.

A woman at full term was admitted to hospital suffering from severe malaria; a child was born after an easy labour 24 hours later. The placenta appeared normal and no parasites were seen in the baby's

blood. The following day the infant died in coma with hyperpyrexia. On post-mortem examination the brain was found to be congested and four parasites per field were seen in smears of blood from the cerebral veins.

The second case was that of a primipara who had two rigors during labour; malaria parasites were found in the blood. The child was born cyanosed and comatose. No parasites were found in blood from the cord and the placenta appeared normal. The infant's blood contained parasites, however, four to the field. Both infant and mother made good recoveries under quinine treatment.

In the third case an infant two days after a normal labour had an attack of malaria; parasites were found in the blood. Quinine effected a cure. The mother showed no clinical signs of malaria, but four days after delivery her blood contained malaria parasites.

N. W.

MEASHAM (J. E.). **A Case of Congenital Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Nov. 26. Vol. 32. No. 3. pp. 423–425. With 3 charts.

A primipara suffered during the 16th week of pregnancy from an acute attack of *vivax* malaria which was treated with atebrin. A relapse in the 38th week, also treated with atebrin, caused the onset of labour. At the time of delivery no parasites were found in the peripheral blood of the mother nor in the blood of the infant, which was examined daily for 10 days. Placental smears showed numerous *vivax* rings, schizonts and gametocytes. When 17 days old the infant had a temperature of 102°F. Its blood then contained *vivax* rings, schizonts and gametocytes. This occurred in the non-transmission season when careful search failed to find a single specimen of *A. fluviatilis*, the only proved local carrier. The author considers this to be a definite case of congenital malaria. *N. W.*

SHUTE (P. G.) & BADENSKI (G.). **A Study of the Numerical Prevalence of Asexual Parasites in Primary Malaria.**—*Arch. Roumaines Path. Expérim. et Microbiol.* Paris. 1937. Dec. Vol. 10. No. 4. pp. 453–459. With 7 charts on 2 folding plates.

Seven cases of primary induced malaria, three *falciparum*, two *vivax* and two *malariae*, were studied. Blood films were made and parasites counted, by Sinton's method, twice daily. The authors found that during the first few days it is often impossible to find parasites. This is markedly so in *malariae* infections, frequent in *vivax* infections but less frequent in *falciparum* infections. The primary fever in all three infections is in most cases intermittent (remittent ?). Fever of this type persists longer in *falciparum* than in other infections, often 7 to 10 days. The necessity for aborting *falciparum* attacks is urgent on or about the tenth day. It is generally advisable in *vivax* infections but *malariae* infections may generally be allowed to continue unchecked. In *vivax* infections the number of parasites in the blood is of less importance than the number of generations of parasites. The lowest parasite counts are found in *malariae* infections. In the interest of the patient it is not of first importance to find out how many parasites he has in the blood: it is important to diagnose the species and to determine whether it is a primary attack. Greater care is needed in the treatment of primary cases than of relapses, and *falciparum* cases

call for more careful treatment than do *vivax* and *malariae* infections. When fever is intermittent (remittent ?) a single blood film is not sufficient to exclude the diagnosis of malaria ; if necessary blood films should be examined three or four days in succession before deciding that the case is not malaria. *N. W.*

TRENSZ (F.). Technique de la mélanofloculation de Henry, modifiée. [**Modified Technique of Henry's Reaction.**]—*Arch. Inst. Prophylactique.* 1938. July–Sept. Vol. 10. No. 3. pp. 217–221.

A detailed account of the technique of Henry's reaction including the preparation and standardization of the reagent. *N. W.*

CHORINE (V.). La réaction de Henry. [**Henry's Reaction.**]—*Arch. Inst. Prophylactique.* 1938. July–Sept. Vol. 10. No. 3. pp. 202–216. With 1 fig.

This is an excellent account of Henry's reaction and sets forth the author's views of the nature of the reaction which are founded on prolonged research and are well known. The reaction is not due to the presence of antibodies in the serum. Melanin has neither the properties of an antigen nor of a toxophore group except for organisms normally deprived of this pigment. Positive reactions are met with in diseases in which there is no production of pigment, and in fowl malaria the feebly positive reaction normally found in fowls decreases during the course of the disease. The intensity of the reaction may vary from day to day in the same serum kept on ice. The reaction only occurs in distilled water or in hypotonic solutions ; this is unlike the behaviour of antibodies. Flocculation in distilled water closely corresponds to melano-flocculation. The action of melanin is that of an indicator in which rôle it can be replaced by numerous other substances. The chemical mechanism of the reaction is complex ; the chief rôle is played by euglobulins. The precipitation of euglobulins is only evident in a dilution of 1 in 10, without an indicator, or of 1 in 4 or 5 with an indicator. A positive reaction only occurs when euglobulins form 32 per cent. of the total proteids of the serum ; above this amount the intensity of the reaction is proportional to the quantity of euglobulin present. Malarial euglobulins have no special affinity for melanin ; they differ in no way from the euglobulins of normal serum. Heating the serum to 55°C. for half an hour abolishes the melanin reaction ; this is due to the alkalinization of the serum consequent on the loss of CO_2. From the clinical point of view the measurement of flocculation of the serum in a dilution of 1 in 10 distilled water gives similar results to its measurement in a 1 in 5 dilution with an indicator added. In therapeutic malaria Henry's reaction becomes positive from the 3rd to the 5th day after injection of malarial blood. The reaction has undeniable clinical value. A negative reaction during a period of apyrexia excludes a diagnosis of malaria ; a positive reaction is a sign of probability. *N. W.*

CHORINE (V.). La réaction de Henry n'est due qu'a des modifications quantitatives dans le sérum. [**Henry's Reaction only due to Quantitative Changes in Serum.**]—*Bull. Soc. Path. Exot.* 1938. Nov. 9. Vol. 31. No. 9. pp. 838–840.

The author restates his view that flocculation produced by distilled water and the flocculation of Henry's reaction are essentially the same.

They are exactly parallel phenomena. Dilution of the serum with hypotonic solutions of ammonium chloride renders the euglobulins unstable. The greater the proportion of insoluble proteids to total proteids the more rapidly is this instability brought about. Another very simple method of rendering the euglobulins unstable is to lower the *p*H of the serum to near the isoelectric point of globulins. No matter what serum is acidified with hydrochloric acid it flocculates with melanin in certain limits. The addition of more acid prohibits flocculation. The degree of dilution or concentration of hydrogen ions in the serum is the determining factor. Malarial euglobulins have no special affinity for melanin. The author describes experiments proving his contentions. *N. W.*

SICAULT (G.) & MESSERLIN (A.). Note sur une technique nouvelle de mélanofloculation en échelle. [**New Technique for Graduated Melanoflocculation Test.**]—*Bull. Soc. Path. Exot.* 1938. Nov. 9. Vol. 31. No. 9. pp. 834–837.

In the absence of a photometer, which not every laboratory possesses, it is not possible to measure the intensity of flocculation either with the technique of Henry, Villain or Trensz. It is the same with the distilled water reaction of Chorine. For this reason the authors of this paper have designed a method to determine the maximum dilution which gives a positive reaction. The test is carried out as follows :—

Three rows of haemolysis tubes, or preferably 7 mm. tubes which the authors use for their micro-reaction, are set up, seven tubes in each row. In the first row are put dilutions of serum in NH_4Cl, 9/1000, *p*H 7. The dilutions are 1/3, 1/10, 1/20, 1/50, 1/100, 1/200, 1/400. In each tube of the second row are put 9 drops of diluted antigen, 1 in 5 (soluble melanin diluted with NH_4Cl 4·5/1000, *p*H 7). The third row are control tubes containing similar dilutions of serum to those in the tubes of the first row, but in this case the diluent is NH_4Cl 4·5/1000, *p*H 6. Two drops from each tube of the first row are then put into the corresponding tube of the second row and shaken. The results are read at the end of three hours. In positive cases there will be a thick brown deposit in dilutions 1/3 to 1/10 and flocculation will be observed in higher dilutions, to a degree varying in different cases.

In the discussion of this paper V. CHORINE said that it is more important to determine the maximum quantity of serum which will produce flocculation ; this indicates the degree of instability of the serum. The minimum dose of serum capable of producing flocculation has a less precise significance. *N. W.*

AZZI (Antonio Sellek) & DEL FRADE (Alejandro). Reacciones serológicas de la sífilis y paludismo en la infancia. Revisión de la literatura y experiencia personal. [**Serological Tests for Syphilis in Infants with Malaria Infection.**]—*Archivos Med. Infantil.* 1938. July–Aug.–Sept. Vol. 7. No. 3. pp. 388–393. [17 refs.] English summary.

Diametrically opposite opinions have been expressed regarding the results of serological tests for syphilis in malarious subjects, some maintaining that positive reactions may be given by the sera of malaria patients in whom there is no indication of syphilis, others that such results are due to concomitant syphilis, or the residue of former infection.

The authors have tested sera from twenty children, 15 of whom were infected with *P. falciparum* and five with *P. vivax*, but in none were there any signs of syphilis. By the Kahn technique two with *falciparum* infection gave positives (one plus, and three plus) and one with *vivax* gave a two plus, *i.e.*, 3 of the 20 gave some degree of positive. By the Meinicke (K.R. II) three gave a one plus, also two *falciparum* and one *vivax* (but the two *falciparum* patients were not the same as those giving the reaction by the Kahn method); by a third method—a modification of M.K.R.II—five positives were obtained, the *vivax* as above and four *falciparum* patients, two of the latter (four plus) being patients whose sera had reacted negatively to the other two tests. The authors conclude that malaria may give positive reactions during an attack of fever. [These small figures are given as percentages 15, 15 and 25 to the respective techniques, if weak and strong be taken together.] *H. H. S.*

SINTON (J. A.). **The Action of Atebrin upon the Gametocytes of** *Plasmodium falciparum.*—*Riv. di Malariologia.* Sez. I. 1938. Vol. 17. No. 5. pp. 305–330. With 1 chart, 2 text figs. & 23 coloured figs. on 1 plate. [48 refs.] English summary.

A summary of the observations recorded at length in this paper was presented by the author to the Royal Society of Tropical Medicine and Hygiene and was reproduced in this *Bulletin*, 1938, Vol. 35, pp. 894–5. *N. W.*

DE MELLO (I. Froilano). **Chemoprophylaxis of Malaria in Portuguese India.**—*South African Med. Jl.* 1938. Oct. 8. Vol. 12. No. 19. pp. 710–724. [46 refs.]

The title of this paper inadequately describes its contents. Therapeutics of malaria more nearly describes its scope, for the vast majority of remedies that have been used in the treatment and clinical prophylaxis of malaria are passed in review and compared. No original observations are recorded. *N. W.*

CHOPRA (R. N.). **Anti-Malarial Remedies: Natural and Synthetic.**—*Calcutta Med. Jl.* 1938. Sept. Vol. 34. No. 3. pp. 183–193. [14 refs.]

This is an adequate description of the relative value of cinchona derivatives and synthetic drugs in the treatment of malaria, for the guidance of the medical practitioner. It contains nothing original. *N. W.*

GORE (Ramkrishna N.). **Cinchona Febrifuge in the Treatment of Malaria.**—*Indian Med. Gaz.* 1938. Oct. Vol. 73. No. 10. pp. 608–609.

Clinical experience has led the author to the conclusion that cinchona febrifuge is more effective than quinine in the treatment of malaria: more effective in the reduction of splenomegaly and in the prevention of relapse. He appears to have used both drugs in smaller doses than those usually employed. The laxative effect of cinchona

febrifuge is referred to. Cinchona febrifuge is of special value in rural communities; honey which is available in villages is a good vehicle for making pills for adults or paste for children. *N. W.*

GUEST (Columba). **The Treatment of Malaria with Malarene.**—*Bull. Inst. Med. Res. Federated Malay States.* 1937. No. 1. 8 pp. With 4 graphs.

Malarene is a proprietary preparation. The manufacturers state that it contains the amorphous alkaloids of cinchona, an alkaline nitrophenate and other "valuable ingredients of strong antimalarial properties." Fifty cases of acute malaria were treated, in alternating sequence, with malarene and quinine. Malarene was inferior to quinine in controlling fever and in causing the disappearance of parasites from the peripheral blood. Malarene gave rise to no toxic effects but some patients treated with it complained of headache and giddiness.

N. W.

LUCHERINI (Tommaso). Primo caso in Italia di emoglobinuria da atebrin. [**First Case reported in Italy of Haemoglobinuria associated with Atebrin Treatment of Malaria.**]—*Policlinico.* Sez. Prat. 1938. Oct. 10. Vol. 45. No. 41. pp. 1849–54, 1857–9. With 1 chart.

This is a long and detailed description of a case of haemoglobinuria in a patient who had been suffering from malaria of long duration. During the three days previous to the onset of symptoms of haemoglobinuria the patient had been taking three tablets of atebrin a day and no other drugs. It is interesting to note that after her recovery the patient was again treated with atebrin without any ill effects. A very high degree of leucocytosis, up to 44,000, was noted during the attack of haemoglobinuria. Some preliminary work on the haemolytic properties of atebrin, *in vitro*, is reported. A short discussion of the literature of malarial haemoglobinuria is also included. *N. W.*

LIVADAS (G.), CANELLAKIS (A. P.) & VALAORAS (V. G.). **Observations on Action of the Antimalaria Drugs in Greece.**—*Riv. di Malariologia.* Sez. I. 1938. Vol. 17. No. 4. pp. 268–290. With 3 figs.

This is a careful record of the treatment of 112 cases of malaria in a mountainous village (population 900) in the north of the Peloponnesus. The number of cases is small but the fact that the patients were kept under continuous observation for a long period of time gives value to the report. The patients were divided into seven groups of about equal size: the first three were treated with quinine, the course of treatment lasting 7, 10 and 20 days respectively. One group was treated with atebrin, one with plasmoquine, one with atebrin followed by plasmoquine, and one with quinoplasmin. The doses given were those now generally recommended. Atebrin displayed the quickest effect upon fever; plasmoquine alone was the least efficient as a febrifuge. Quinoplasmin was the most active in the reduction of splenomegaly. Atebrin caused the disappearance of schizonts from the blood rather more rapidly than any other treatment. The gametocytes

of *malariae* were more resistant to treatment than were those of *vivax*. Plasmoquine alone among the remedies used destroyed *falciparum* gametocytes. Quinine was more effective than the synthetic remedies in causing an increase in red cells and in their haemoglobin content. Quinoplasmin was most effective in preventing relapse. The conclusion is reached that the combination of atebrin and plasmoquine, and more especially the combination of quinine and plasmoquine, have special advantages in the general treatment of malaria. *N. W.*

CHOREMIS (K.) & SPILIOPOULOS (G.). Paralytische Erscheinungen nach Gebrauch von synthetischen Antimalaria-Mitteln. [**Paralytic Manifestations following Administration of Antimalarial Synthetic Drugs.**]—*Deut. Med. Woch.* 1938. Nov. 18. Vol. 64. No. 47. pp. 1680–1682.

The author first describes the case of a child aged 3 years who suffered from benign tertian malaria, for which he was given four intramuscular injections of quinine, this was followed by two intramuscular injections of atebrin, 0·1 gm. daily ; after an interval of a day, he received on the first day 2 tablets of plasmoquine simplex, 0·01 gm. in each, on the second day half a tablet was given.

Two days after the taking of plasmoquine there occurred obstinate vomiting with aphonia and difficulty of swallowing, marked exhaustion and atony of muscles, especially of the lower extremities. The aphonia and difficulty of swallowing disappeared in 2 days but the muscular atony lasted for 14 days. Later, as he had still enlargement of the spleen and fever, atebrin was again administered with the result that the same symptoms again developed, aphonia, difficulty of swallowing and general muscular atony : the symptoms appeared to be due to paralysis of the laryngeal musculature.

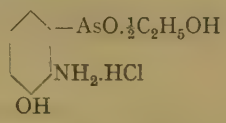
In another case of a child of 1½ years paralytic symptoms followed a 5-day course of atebrin 0·1 gm. daily *per os* ; the larynx was affected and there was aphonia and difficulty in swallowing. In three other children there developed symptoms of peripheral neuritis following administration of atebrin *per os*. In two others paralysis of the lower extremities followed administration of atebrin *per os*, 0·1 gm. twice daily ; in one 8 days after taking the atebrin and in the other 10 days. In two other children following administration of plasmoquine simplex, 0·01 gm. daily for 8 days in one case and 7 days in the other, symptoms of paralysis of the laryngeal muscles and the muscles of the lower extremities occurred in the respective cases.

The author concludes from a consideration of these cases that the valuable antimalarial synthetic drugs, atebrin and plasmoquine, are neurotropic. Hence it is very important that a course should not exceed 5 days. Further, persons suffering from malarial cachexia should receive smaller doses than those usually prescribed, and, if possible, a course of one of the vitamin B preparations should be combined with them. *E. D. W. Greig.*

GOLDMAN (Douglas). **The Use of Mapharsen in the Treatment of Malaria.**—*Amer. Jl. Med. Sci.* 1938. Oct. Vol. 196. No. 4. pp. 502–509. With 8 figs.

Mapharsen is a recently introduced arsenated benzine compound for the treatment of syphilis. It is thought to be the effective breakdown

product of the arsphenamines in the body. Its composition is meta-amino parahydroxy phenyl arsine oxide :—



It is administered intravenously, the dose being from 0·04 to 0·06 gm., according to the patient's weight. Injections may be repeated at intervals of from 5 to 7 days. The patient should be fasting. Information is given concerning 24 patients who had been treated with malaria therapy and who subsequently received mapharsen injections : eight temperature charts are produced. One case of naturally acquired malaria was also treated with the drug. All were cases of *vivax* infection. The results were strikingly good. Parasites disappear almost immediately after an injection : after 24 hours it is only rarely that a disintegrating parasite can be found in blood smears. Splenomegaly begins to disappear almost as rapidly. The timing of the injection determines the occurrence or non-occurrence of a further febrile attack after treatment. If a chill be due in less than 24 hours after injection it usually occurs ; if not, or if the injection be given at the height of a chill, subsequent febrile attacks are eliminated. The author considers mapharsen to be the drug of choice in the treatment of malaria ; it is immeasurably more effective than quinine, certainly as effective as atebrin ; it is easy to administer and safe to use. It is much less toxic to debilitated patients than is neoarsphenamine or even quinine. A case of malaria associated with severe leucopenia responded favourably and with an increase of leucocytes. Recurrences after mapharsen treatment are stated to be rare. No opportunity occurred for testing the value of the drug in the treatment of *falciparum* infections.

N. W.

NIVEN (J. C.). **Sulphanilamide in the Treatment of Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Nov. 26. Vol. 32. No. 3. pp. 413–418. With 6 graphs.

Eighty unselected cases of acute malaria were treated in Kuala Lumpur with sulphanilamide. Of these cases 34 were *falciparum* infections, 38 *vivax*, and 8 *malariae*. As a control 68 cases (30 *falciparum* and 38 *vivax*) were treated with quinine. All patients were kept under observation for at least 7 days ; parasite counts were made daily by Sinton's method. A red and white blood cell count, differential count, and Arneth index estimation were done at the beginning and end of the course of treatment. All patients were Chinese or Indians of the labouring class. The sulphanilamide used was prontosil album (Bayer), 3 grams a day, in two doses, for 7 days. To the controls quinine bihydrochloride in solution was given daily for 7 days, the dose being 2 gm. per 100 lb. body weight.

It was found that prontosil abolishes fever and parasites in the majority of cases of *falciparum* malaria but is not so efficient as quinine : in 5 cases parasites were still present at the end of the course. In *vivax* cases prontosil is still less efficient : parasites were present in the blood of 15 patients at the end of treatment and two still had fever. Prontosil

was not an efficient remedy for the 8 cases of *malariae* infection. Mosquitoes fed on four crescent carriers at the end of treatment were readily infected. The author concludes that prontosil is much less efficient than quinine, is more dangerous (no toxic effects were observed, however, in this series of cases) and is much more costly. [See also this *Bulletin*, 1938, Vol. 35, pp. 561, 562, 896.] *N. W.*

SORLEY (E. R.) & CURRIE (J. G.). **Notes on the Experimental Use of Prontosil Album in the Treatment of Malaria.**—*Jl. Roy. Nav. Med. Serv.* 1938. Oct. Vol. 24. No. 4. pp. 322–325.

Ten cases of *vivax* malaria in Asiatic labourers were treated with prontosil album, ten grains three times a day for four days. The drug caused rapid alleviation of the patients' symptoms, more marked than is obtained with other anti-malaria drugs. In some cases parasites persisted in the peripheral blood. Three of the cases relapsed soon after the prontosil treatment. The authors recommend that the prontosil treatment be followed by a five days course of treatment with atebrin. *N. W.*

PIZZILLO (Giuseppe). Riattivazioni da rimpatrio in malarici reduci dall'A.O.I. [**Reactivation of Malaria among the Repatriated from Italian East Africa.**]—*Riforma Med.* 1938. Oct. 8. Vol. 54. No. 40. pp. 1523–1525. [13 refs.]

The author discusses the time necessary for the spontaneous, or climatic, cure of malaria, in patients who have removed to a non-malarial locality and quotes the opinions of several authorities. A study was made of 200 case cards of malaria patients who were repatriated from Italian East Africa. Reactivation of the malaria parasite in such persons may be either early, normal or late. In this, and in other respects, the reactivation is similar to that produced by intravenous adrenalin therapy. Much stress is laid upon the substantial identity of the mechanism of action of Ascoli's treatment and of natural climatic therapy. Ascoli's treatment offers certain advantages: it can be carried out anywhere, and by it the patient can be more rapidly restored to health than he can by nature unaided. *N. W.*

PIZZILLO (Giuseppe). Sulla cura di Maurizio Ascoli nelle infezioni malariche. Nota XI. Ulteriori ricerche sulle riattivazioni. [**Reactivation of Malaria during and after Ascoli's Treatment.**]—*Riv. di Malariologia.* Sez. I. 1938. Vol. 17. No. 4. pp. 291–294. German summary.

The author discusses the reactivation of the malaria parasite that is associated with Ascoli's treatment, with special reference to the febrile attacks that are occasionally experienced after the conclusion of treatment. In 5 per cent. of the chronic cases of malaria which have undergone the complete course of treatment without febrile manifestations signs of reactivation of the malaria parasite are met with during the first week following the completion of treatment. In chronic or recent infections, with a greater tendency to relapse, such post-treatment reactivations are encountered in 20 per cent. of cases in the first week after treatment, in 12 per cent. in the two successive weeks. In recent infections reactivation occurs in the fourth, fifth or sixth week,

or even later, in 7 to 9 per cent. of cases. These late post-treatment febrile manifestations differ from malarial relapses inasmuch as recovery is spontaneous without the administration of quinine or other specific remedy; there is at the worst only slight and transitory splenic enlargement, and they have little or no ill effect on the general condition of the patient or on the blood. The interval that elapses between the end of treatment and these attacks varies inversely with the duration of infection. *N. W.*

SINTON (J. A.), HUTTON (E. L.) & SHUTE (P. G.). **Unsuccessful Attempts at Causal Prophylaxis with Certuna in Malignant Tertian Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Nov. 26. Vol. 32. No. 3. pp. 419–422.

Certuna, originally called Cilional [see also this *Bulletin*, 1938, Vol. 35, pp. 562, 563, 564], is a product of Bayer's Elberfeld laboratories; it is a dialkylamino-oxyquinolylaminobutane. It has been shown to have a destructive action on *falciparum* gametocytes. The experiments described in this paper were designed to test the potentialities of Certuna as a true causal prophylactic of *falciparum* malaria.

A batch of *A. maculipennis* var. *atroparvus* was infected with a Rumanian strain of *P. falciparum*.

One patient was bitten by five infected mosquitoes 25 minutes after receiving a dose of 0·06 gm. of Certuna. He received 0·02 gm. thrice daily for the next 6 days. Fever started on the 12th day following the bites and parasites were detected the following day.

The second patient received similar treatment except that the initial dose of Certuna was given 45 minutes before 160,000 sporozoites in Locke's fluid were injected. Fever started on the 7th day and parasites were found, in a thin film, on the 10th day.

In a third case three doses of 0·02 gm. were given the day before, and 0·06 gm. 25 minutes before the patient was bitten by 7 mosquitoes. The drug was given for the succeeding 5 days, 0·06 gm. a day. Fever appeared on the 10th day and parasites on the 11th day.

In two further cases doses of 0·04 gm. and 0·06 gm., thrice daily, for 7 days, were unable to prevent the development of infection.

The drug was well tolerated but it failed in all five cases to prevent infection. The dosage of sporozoites was greater than is usually acquired in nature. *N. W.*

VERSLAGEN EN MEDEDEELINGEN BETREFFENDE DE VOLKSGEZONDHEID. 1938. July. 26 pp.—Verslag over de jaren 1936 en 1937 van de malaria-commissie uit den Gezondheidsraad [SCHÜFFNER (W. A. P.), Chairman]. [**Report of the Malaria Commission of the Council of Public Health for 1936 and 1937.**]

There is much close discussion in this report on questions of importance in the field campaign against malaria. Some of it has been presented in various publications. The most instructive of the headings in the report are: (1) Therapeutic measures. (2) Destruction of adult mosquitoes as an antimalarial measure. (3) Abolition of the breeding places of *Anopheles maculipennis atroparvus*.

(1) *Therapeutic measures.*—Most of the observations here recorded relate to the prevention of relapses and the development of the so-called "healthy parasite carrier." In this respect atebrin does not seem

to have been particularly satisfactory. Plasmoquine on the other hand, used as a 14-day cure, was efficacious in preventing relapses. A 14-day treatment, however, of all malaria sufferers did not make much impression on the infection rate of Anopheles. As a really satisfactory method of relapse prevention the Commission commend heartily the 3-week plasmoquine cure of SINTON. Their final conclusion on this subject is a negative one. "A therapeutic malarial campaign in Holland, while not exactly impossible, is under present conditions not practical."

(2) *Destruction of Adult Mosquitoes.*—Theoretical considerations form the basis of this antimalarial measure. KORTEWEG maintained that a portion of the sufferers from malaria in a given year have received their infection in the previous autumn on the grounds that :—(1) infected Anopheles are only found in late summer and autumn and almost exclusively in dwellings ; (2) individuals infected as a test in autumn developed malaria in the following spring and summer. It is not all species of *maculipennis* however which participate, in Holland, in this autumn infection. Only *A. maculipennis atroparvus*, in spite of beginning sexual inactivity, continues to suck human blood in late summer. *A. maculipennis messeae*, whose egg-laying ceases during August, ceases also to suck blood. "If then," it is asked, "all infected anopheles in human dwellings are killed off in late summer and autumn will all malaria be prevented and if not what malaria is to be expected in the following year ?" "KORTEWEG would answer the question :—Those cases of primary malaria which manifest themselves before the 1st May would be prevented." The house-spraying which was the method to be adopted for killing off infected Anopheles did not require to be applied altogether indiscriminately. Certain facts were taken into account :—" (1) Anopheles infection in late summer and autumn is restricted to a comparatively small number of houses which become 'centres of infection.' (2) From these centres anopheles spread infection up to the end of October to neighbouring houses within a radius of not more than 100 metres. (3) About 4/5 of the persons who in a given year suffer from malaria live at most 100 metres distant from a centre of infection, which had existed in the previous summer and autumn." It was therefore the expectation of the Commission that killing of all Anopheles in late summer and autumn, in the village of Uitgeest for example, should reduce its malaria of the following year to one-fifth of its ordinary frequency. A spraying campaign took place in 1936 and it was found that :—(1) In a house that had been sprayed with the insecticide Shelltox, not only were all Anopheles killed, but the house remained for 14 days thereafter less attractive for Anopheles. The quantity used was abundant, amounting to 0·4–0·5 litres per house per treatment ; this is 5 to 6 times as much as is reckoned (0·08 litre) necessary for killing the Anopheles in a house. (2) After the spraying at the end of August the Anopheles were again numerous 3 weeks later in the treated house. Even after the 2nd and 3rd treatment in the middle of September and beginning of October mosquitoes returned, although now in small numbers. Strict avoidance of the possibility of infection required that sprayings succeeded each other every 14 days. The facts regarding malaria in Uitgeest are given as :—(1) There were 343 primary cases in 1936 and 71 relapses from 1935. (2) In 1937, however, there were only 31 primary cases and 25 relapses. The result may be regarded as satisfactory, but although *Anopheles maculipennis atroparvus* is to be accepted as the most important vector of malaria in

North Holland the method of killing off this mosquito by spraying in autumn is considered somewhat costly for general adoption.

(3) *Abolition of breeding-places of A. maculipennis atroparvus.*—It has been demonstrated that the density of the larvae of *A. maculipennis atroparvus* in water with salt content of 1,500 mgm. Cl. per litre or higher is as much as twelve times that in water of 500 mgm. Cl. per litre. The suggestion is made that as the Ijsselmeer changes from salt water to sweet water the consequence will be the disappearance there of the breeding-places of the malaria carrying mosquito.

W. F. Harvey.

STROTHER-SMITH (F. F.). **Anti-Mosquito Measures in Cantonments with Special Reference to " Dry Day " instituted in 1927.**—*Indian Med. Gaz.* 1938. Oct. Vol. 73. No. 10. pp. 606–608.

On one day a week in certain cantonments in Northern India all water receptacles must be empty from 6 a.m. to 9 a.m. Such receptacles include animal water troughs, garden tanks and irrigation ditches in gardens, small pits and bullock runs from wells, etc. Fire buckets are emptied and immediately refilled. The edges of larger collections of water which cannot be emptied are kept free from grass and undergrowth. Such measures if rigidly enforced and carried out throughout the mosquito breeding season result in a markedly diminished prevalence of mosquitoes. Details of the special inspection staff employed are given. The author is experimenting, with success, with a spraying machine called the " phantomyst " for the destruction of adult mosquitoes. The culicide used is a 3 per cent. solution of " Lethane " in kerosene oil. The machine produces a fine mist which penetrates well and is very economical : five minutes spraying with a large model only consumes one ounce of fluid. *N. W.*

MICHELSON (E. G.). **An Apparatus for Continuous Oiling of Streams.**—*Indian Med. Gaz.* 1938. Oct. Vol. 73. No. 10. p. 612. With 1 fig.

Oil screens are commonly used on small slow-running streams in Assam. These are effective but sudden storms may sweep away all the oil. To obviate this the author describes a simple device. Two quart tins are securely wired one to each supporting upright of the screen, just above high-water level. Two pieces of wick 2½ inches wide of double thickness have one end immersed in the tin where it is kept in place by a weight and the other stitched to the gunny or canvas of the screen. The gunny of the screen is wide enough to allow for rising water. The tins are filled with oil. A piece of wire prevents the wick resting against the outside of the tin and thus wasting oil. One quart of oil will give a continuous coating to the stream for eight days. Screens should be spaced about 130 yards apart but this distance varies with the configuration of the stream. The even flow of oil is unaffected by spates. *N. W.*

KING (W. V.). **Experiments with Phenothiazine and Mosquito Larvae.**—*Jl. Econom. Entom.* 1938. Oct. Vol. 31. No. 5. pp. 610–611.

A solution consisting of 1 gm. phenothiazine in 20 cc. of sulphonated petroleum oil and 5 cc. of acetone was found to be an efficient *Culex* larvicide in laboratory conditions. The solution is mixed with water

before evaporation of the acetone occurs. The phenothiazine was fatally toxic to *Culex* larvae in dilutions of one in two million. Much more experimental work is required to determine whether this larvicide has a field of usefulness in practical anti-mosquito work. *N. W.*

BRUMPT (E.). Fréquence et origine des " Black Spores " de Ross au cours de l'infection des stégomyies par le *Plasmodium gallinaceum.* [**Frequency and Origin of Ross's " Black Spores " in Stegomyia infected with** *Plasmodium gallinaceum.*]—*Ann. Parasit. Humaine et Comparée.* 1938. May 1. Vol. 16. No. 3. pp. 220–241. With 2 figs. & 4 plates. [34 refs.]

In this article the author discusses the various theories which have been advanced as to the nature of the black spores which were first described by Ronald ROSS in 1898 on the stomachs of mosquitoes infected with the bird malarial parasite. More recently REICHENOW (1932) found them in all of twelve *Theobaldia annulata* infected with the bird parasite *Plasmodium circumflexum.* In his work on the development of the fowl parasite *P. gallinaceum* in *Stegomyia fasciata* and *S. albopicta* the author has encountered black spores in 6 to 7·5 per cent. of a large number of these mosquitoes fed once or twice on infected fowls. He does not agree that they represent resistant spores, or that they are instances of hyperparasitism or, as maintained by Bruce MAYNE, that they are derived from the smallest branches of the tracheal system. It is clear that foreign bodies, either parasitic or not, in the tissues of mosquitoes are liable to undergo chitinization, and malarial oöcysts in various stages of development and sporozoites are no exception to this rule. When the groups of black spores, rounded bodies or the more typical banana-shaped structures, are of the size of malarial oöcysts it may be concluded that they have been formed by the chitinization of oöcyst contents. A similar chitinization of sporozoites which have been scattered through the body after rupture of mature oöcysts may take place. In either case the banana-shaped black spores are considerably larger than individual sporozoites, so that it would appear that the deposit of chitin has occurred around a group of sporozoites rather than on a single one. Chitinous masses which are larger than malarial oöcysts have probably been derived from other extraneous bodies. As an illustration of this FÜLLEBORN's observation of a chitinized microfilaria (*F. repens*) in a Malpighian tube of *Anopheles maculipennis* is quoted.

In this study the author has never found black spores in mosquitoes which had been fed on uninfected fowls or on birds infected with the parasites which do not develop in the mosquitoes used. It can be accepted, therefore, that the presence of black spores of the type so frequently associated with malarial infections is an indication that malarial infection of the mosquito has occurred.

The paper is illustrated by text figures and four excellent plates depicting the various types of black spores encountered. *C. M. W.*

COGGESHALL (Lowell T.) & EATON (Monroe D.). **The Complement Fixation Reaction in Monkey Malaria.**—*Jl. Experim. Med.* 1938. June 1. Vol. 67. No. 6. pp. 871–882. With 6 figs. [13 refs.]

From the blood of infected monkeys or from the spleens in cases of intense infections antigens can be prepared which give a positive

complement fixation reaction with the serum of infected animals. The antigen must be liberated from the parasites either by freezing, drying and grinding or by prolonged autolysis, after which it is extractable by normal saline solution. Complement fixation substances appear in the blood of infected monkeys early in the infection. After the acute phase has been passed over by the use of quinine or immune serum there is a rise in titre followed by a fall. During the chronic phases there is a rise in titre after relapses. As regards the production of antibodies there is a marked variation amongst different animals, some producing very little, others a considerable amount. It was noted sometimes that animals which produced large amounts of the protective antibodies previously described were bad producers of complement fixing antibodies. From this it would appear that the two antibodies differ from one another. In view of its failure to be extracted by lipoid solvents and its destruction by tryptic digestion it would seem that the complement fixing antibody is of a protein nature. *C. M. W.*

EATON (Monroe D.). **The Agglutination of** *Plasmodium knowlesi* **by Immune Serum.**—*Jl. Experim. Med.* 1938. June 1. Vol. 67. No. 6. pp. 857–870. With 4 figs. on 2 plates. [15 refs.]

The author has tested the serum of monkeys infected with *Plasmodium knowlesi* for the presence of agglutinins against these parasites. He has shown that such agglutinins appear in the serum of monkeys between the 15th and 45th days of an infection and that the titre rises as the infection subsides. The agglutination brought about by acting on infected red cells or on parasites liberated from haemolysed infected red cells can be recognized both macroscopically and microscopically. It is only the mature parasites which are involved in this agglutination. The sera of animals which have been superinfected a number of times may give agglutination at a dilution of 1 : 1,000. The reaction is specific, as the sera of normal monkeys or monkeys infected with other species of malarial parasite are quite inactive. *C. M. W.*

COGGESHALL (Lowell T.) & EATON (Monroe D.) **The Quantitative Relationship between Immune Serum and Infective Dose of Parasites as demonstrated by the Protection Test in Monkey Malaria.**—*Jl. Experim. Med.* 1938. July 1. Vol. 68. No. 1. Pt. 1. pp. 29–38.

It is shown that the minimal number of parasites required to produce *Plasmodium knowlesi* infections in *rhesus* monkeys is 1 to 10. The interval between the injection of parasites and their appearance in the peripheral blood varies with the number of parasites injected, but the interval between the appearance of parasites and the death of the animal is unaffected by the dose. The severity of the infection is the same whether the infecting dose is small or large (1 or 100,000 parasites). Protective serum from chronically infected monkeys will protect against death if administered at the time of the injection of parasites and daily afterwards. There is, moreover, a definite relationship between the quantity of serum required to effect the protection and the dose of parasites injected if before the parasites are injected they are incubated with immune serum for half an hour at 37°C. In some cases, when the number of injected parasites was small, the half hour's

incubation with immune serum, if relatively large in amount, resulted in the death of all the parasites, for their injection failed to produce infection. *C. M. W.*

COGGESHALL (Lowell T.) & KUMM (Henry W.). **Effect of Repeated Superinfection upon the Potency of Immune Serum of Monkeys harboring Chronic Infections of** *Plasmodium knowlesi.*—*Jl. Experim. Med.* 1938. July 1. Vol. 68. No. 1. Pt. 1. pp. 17–27. With 2 charts.

The authors have already shown that the pooled blood from a group of monkeys in the chronic stage of a *Plasmodium knowlesi* infection contains antibodies which are able to diminish the effect of this parasite on newly inoculated monkeys to the extent that they are saved from death. The antibody content of the pooled bloods must be low, as large amounts of the serum are required to bring about the protection referred to. In the present paper it is shown that if the chronically infected monkeys are superinfected seven times during the course of two months the antibody content of the pooled blood is considerably higher, less serum being required to effect protection. If, on the other hand, further superinfections are carried out, the antibody content diminishes owing, it is assumed, to the absorption of antibody by the large number of parasites injected. *C. M. W.*

MISCELLANEOUS.

NYASALAND PROTECTORATE. ANNUAL MEDICAL & SANITARY REPORT FOR YEAR ENDING 31ST DECEMBER, 1937. Appendix IV. 27 pp.—**Nutritional Review of the Natives of Nyasaland.** Preface by A. D. J. B. WILLIAMS, O.B.E., Chairman, Native Welfare Committee. [Summary appears also in *Bulletin of Hygiene.*]

This review contains a mass of clearly displayed information, and is of special importance in that it appears to be the first nutritional study made of the natives of Nyasaland. The main part of the survey reviews the present conditions of nutrition in Nyasaland, and deals with prison, hospital and school dietaries, labour conditions and dietaries, cost of food, nature of diet and dietary habits of the general population, related agricultural conditions and problems, deficiency diseases, etc. This is followed by a review of further studies and researches which appear desirable, with an analysis of foodstuffs, an anthropological and nutritional survey and an investigation of the fishing resources of Lake Nyasa. Then follow reviews of practical measures which have been taken in the past to apply scientific knowledge to the improvement of nutrition and of further measures which it appears desirable to take in the future, and of the consequences which improvements in nutrition may have on the economy of the Dependency. Other sections give the various questionaries which were sent out for preparing the Report, and a list of edible wild plants in Nyasaland. [So much material is contained in this short appendix that it is impossible to condense and summarize it adequately, and the review should be read in full by all who are interested in the nutritional problems of native peoples.]

Douglas C. Harrison.

TEICHLER (G.). Einige Besonderheiten bei ostafrikanischen Eingeborenen. [**Medical Observations among East African Natives.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1938. Sept. Vol. 42. No. 9. pp. 421–427. With 5 figs.

The author, who writes from Mnyusi in Tanganyika Territory, is in medical charge of sisal plantations. The labourers, about 1,500, come from a variety of tribes as far away as Rhodesia and Mozambique. Malaria is severe in those from the highlands and may simulate epidemic meningitis. On Lake Victoria he saw several cases of anal stricture in women. All gave a positive Frei reaction. In other cases there was enlargement and induration of the labia and stricture of the vagina and, in men, hard swellings in the groin-glands region.

A case of firm growths in the nostrils regarded as yaws was shown microscopically to be one of rhinoscleroma. The vitamin question is acute and under careful study by the Administration. Prescorbutic symptoms—feebleness, pallor, palpitation, fatigue, vulnerability (in the literal sense)—are not rare but the author has not seen true scurvy. Patients from Lake Tanganyika with anaemia and swollen feet are common. Hookworm is suspected but is rarely found and these patients bear drugs badly, especially carbon tetrachloride. Salvarsan also is ill borne and a case of salvarsan rash is figured. A frequent symptom in these natives is night blindness, coming on 2–3 months after they have left the interior. It is attributed to a lack of vitamin C. The author finds that the native diet at home and in the plantations varies little

and in the plantations includes more meat. The single difference seems to be the beer which they drink freely at home but in the plantations only on Saturday and Sunday. However, he seems to doubt the adequacy of this as a cause of avitaminosis. [Do the plantation labourers cook their food themselves or is it overcooked for them ?] He advises the regular administration of palm oil as a furnisher of vitamins A and C.

The rest of the paper is given to a discussion of Gillan's oedema with details of cases. The conclusion is that this is not a disease *sui generis* but has various causes, among which malaria is prominent.

A. G. Bagshawe.

CONGO BELGE. Fonds Reine Elisabeth pour l'Assistance Médicale aux Indigènes du Congo Belge. Rapport annuel 1937. [**The Foréami Service in the Belgian Congo. Report for 1937.**]—104 pp. With 2 figs. & 2 maps (1 folding). Bruxelles : 112 Rue du Commerce.

The 1937 annual report of the Foréami institution shows that the activities have been extended to cover two-thirds of the Kwango area. The organization is briefly described and it is again explained that the object is the repeated examination of the natives in their natural surroundings and the treatment of all individuals requiring it. The medical and sanitary staff have contributed 552 working months during the year [which corresponds to about 46 persons working for the whole time. More than half of these are doctors.] The native staff numbers 521 persons, and the number of persons medically assisted has now passed 900,000. Almost the whole of the population of Kwango have been provided with medical certificates. These figures give an idea of the magnitude of the undertaking.

Brief details are given of the various diseases treated, of which the chief were :—10,258 cases of trypanosomiasis with 5,101 cures [this section of the report will be abstracted elsewhere in this *Bulletin*], 3,628 of yaws, 2,045 of leprosy, 3,943 of ulcer, and 52,542 of helminthiasis. Surgical operations numbered 376.

The social services include maternity and child welfare and village sanitation. A section on the demography of Kwango is included, and a list of the publications of the members of the staff is given. [See also this *Bulletin*, 1935, Vol. 32, p. 501.] *C. W.*

LEDENTU (G.) & PELTIER (M.). Les maladies transmissibles observées dans les colonies françaises et territoires sous mandat pendant l'année 1935. [**Transmissible Diseases in the French Colonies and Mandated Territories in 1935.**]—*Ann. de Méd. et de Pharm. Colon.* 1937. July–Aug.–Sept. & Oct.–Nov.–Dec. Vol. 35. Nos. 3 & 4. pp. 748–928 ; 1207–1335. With 3 maps.

This Report covers a very wide field and it is only possible to indicate some of its contents. Its interest is lessened too owing to its late appearance.

It is arranged under Disease headings, each disease being considered in turn, as it occurs in the French colonies all round the world. First come the " pestilences "—plague, cholera, yellow fever, smallpox, typhus ; then the endemo-epidemic diseases—malaria and blackwater, trypanosomiasis, dysentery, relapsing fever, intestinal parasitism, schistosomiasis, filariasis, dengue, beriberi, yaws, tropical ulcer. [We should exclude beriberi from this category.]

A few points of general interest or unfamiliar to the reviewer will be noted. Under plague in Senegal—among defensive measures against rats it is recommended to keep a zone round each village clear of cultivation, but manioc may be tolerated because the soil remains clean and easy of surveillance, burrows can be promptly detected and fumigated, and the rat never attacks the roots below ground.

Under yellow fever—of 14 cases in Africa (2 suspected) one was labelled acute ascending myelitis, and there was no suspicion of yellow fever in life; its nature was revealed by liver examination post mortem. Two of the subjects contracted infection in the bush, which raises the question of jungle yellow fever. The evidence of malaria in Madagascar was noteworthy. Of 787,000 consultations, in 646,000, or 80 per cent. this was the diagnosis and 10,000 were admitted to hospital. In Réunion Is., which was malaria-free before 1869, half the consultations were for malaria. The D.M.S. reports that the major cause is deforestation on high ground with consequent erosion of soil and obstruction of the beds of the rivers.

Under bilharziasis in Cameroon it is noted that 74 per cent. of infections were in boys between 5 and 15 years and 45 per cent. in girls; after the introduction in the Chad area of shower-baths in several schools, as a substitute for river bathing, the incidence of infection fell. The trypanosomiasis section is a full one with many tables and sketch maps.

Diseases common to France and the tropics are treated in the second fascicle and a fourth category, social diseases, which includes leprosy. These do not call for comment. *A. G. Bagshawe.*

COLONIAL OFFICE: **Pitcairn Island. General Administrative Report and Medical Report.** (Colonial No. 165).—79 pp. 1938. London: H.M.S.O. [1*s.* 3*d.*] [**Medical Report** by Duncan COOK, M.D., M.R.C.P., D.P.H. pp. 52–79. With 1 chart.]

The chief interest of this Report lies in the record that since 1858 while other Pacific populations were decreasing that of Pitcairn Island has grown from 16 to 209 and that though the diet does not include milk or butter, and eggs and green leafy foods are relatively scarce, apart from the early loss of teeth, the people are strong and healthy.

The Report is based on enquiries made during 39 days' residence in May–June, 1937. Pitcairn, which lies at Lat. 25·4 S. on the route between the Panama Canal and New Zealand, was colonized in 1790 by nine mutineers from the "Bounty" making with their Tahitian wives and other natives 28 souls.

In 1856, 192 persons were at their own request removed to Norfolk Island but some returned. In 1864 there were 45 in Pitcairn and in 1936, 209, all but nine descendants of the mutineers. The causes of this remarkable increase appear to be the isolation of the island, almost complete till the opening of the Panama Canal in 1914, combined with the difficulty of landing and the consequent short stay of ships; the freedom from "social and economic prejudice" of the half-caste islanders and the predominantly European culture, which protected them from venereal disease and alcohol. For 100 years the islanders have been Seventh Day Adventists and apparently strict ones. The climate is good, diseases are few, and inbreeding has had no harmful effects.

Of the 200 population 110 are males and between 16 and 45 years the male preponderance is 16.

It is noted that "daybiting mosquitoes" breed freely in the rain-water cisterns, flies are almost unknown. Semi-wild goats roam the island and are shot for food but their milk is not used. Chickens are plentiful but are preyed on by the numerous rats. Fruits are of many kinds and are abundant. Shortage of animal food is now compensated by the importation of tinned meats. The diet seems to be both chemically and mechanically inadequate. [This mechanical inadequacy apparently refers to shortage of roughage.]

Almost the whole population was medically examined. They appeared to be of average intelligence and physically very strong. The absence in children of enlarged tonsils and adenoids was noted. The front teeth are nearly always lost and few islanders reach the age of twenty without requiring a complete or partial denture. Faeces were examined for hookworm ova without success. Schick, Dick, and Mantoux tests showed 50 per cent. Schick positive, 50 per cent. Dick positive and 20 per cent. tuberculin positive; no comment is made on these results.

The author recommends that a medical officer from New Zealand should reside 10–14 days on the island every 2–3 years and that an island girl should be trained to be a Public Health Nurse. *A. G. Bagshawe.*

JERACE (F.). La colorazione alla Romanowsky con il liquido di Puntoni. [**"Romanowsky" Staining with Puntoni's Fluid.**]—*Ann. d'Igiene.* 1938. Sept.–Oct. Vol. 48. No. 9–10. pp. 606–607.

The fluid is made up as follows:—

Azur	5 gm.
Methylene blue	2·5 gm.
Eosin A.B. extra (Glübler) ...	2·5 gm.

These are ground together thoroughly in a glass mortar and added to 500 cc. of pure neutral glycerine. To this is added 500 cc. pure methyl alcohol and the mixture is shaken gently and kept at 37°C. for 24 to 48 hours. It is then decanted or filtered and preserved in a yellow bottle with a ground stopper. This stain is used in the same way as Giemsa's stain, but gives better results in demonstrating basophil elements. *C. W.*

PAMPANA (E. J.). Colorazione dei preparati a goccia spessa; demoglobinizzazione con soluzioni isotoniche. [**Haemolysis with Isotonic Solution in the staining of Thick Drop Preparations.**]—*Riv. di Malariologia.* Sez. I. 1938. Vol. 17. No. 4. pp. 300–304. English summary (8 lines).

The author found that thick drop blood films could be haemolysed by solutions of NaCl in concentrations up to 10 per 1,000. Evidently dried blood in this respect differs from fresh blood. The advantage of using an isotonic solution is that distortion of cells and parasites does not occur and a colourless background is produced. It is better, however, to use an isotonic buffered solution, made up as follows:—

Na_2HPO_4	14·824 gm.
KH_2PO_4	5·33 gm.
Distilled water	1 litre.

This maintains a *p*H of 7·2.

The method is to dilute 1 cc. of Giemsa stain with 19 cc. of this solution, stain for 20 minutes, wash rapidly in distilled water and allow to dry. If a precipitate forms in the water after the addition of the two salts, it should be left for a few days and then filtered; it is then fit for use. *C. W.*

JACKSON (R. B.). **The Taking of Microphotographs with the Aid of a Simple and Inexpensive Apparatus.**—*Chinese Med. Jl.* 1938. Oct. Vol. 54. No. 4. pp. 367–371. With 13 figs.

A Metron Reflex Drawing outfit obtained from Messrs. C. Baker, 224 High Holborn, London, to which is fitted a microscope, is enclosed in a box as shown in the figure. To the box is fitted a camera which takes plates. When the plate holder is removed an image can be projected on to a negative placed in the movable frame I J. The procedure is carried out in a dark room.

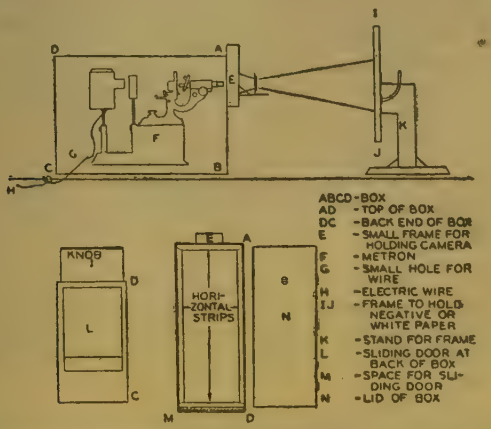


Diagram illustrating details of the box and movable glass frame used in taking microphotographs.

[Reproduced from the *Chinese Medical Journal.*]

The image is focussed by manipulating the microscope and camera, on to white paper in the frame, by the aid of the red light of the dark room. A negative is then substituted for the paper, the Metron lamp is switched on and an exposure made by means of the camera shutter.

Excellent microphotographs taken in this way are used to illustrate the article. The price of the Metron outfit (without microscope) is given as £6 2*s.* 6*d.* *C. W.*

BRIESE (Reinhold R.) & COUCH (James F.). **Preservation of Cyanogenetic Plants for Chemical Analysis.**—*Jl. Agric. Res.* 1938. July 15. Vol. 57. No. 2. pp. 81–107. With 2 figs. [31 refs.]

A considerable number of tropical plants are cyanogenetic, that is they contain substances which, on addition of water, give rise to the

formation of hydrogen cyanide. It is important, if analysis of them is to be at all accurate, that some method of preserving them should be found which does not materially change this property, especially under circumstances where they have to be sent to a distant laboratory. It must be remembered also that the rate of formation of HCN in cyanogenetic plants is not uniform. It begins to fall in 8–10 hours and several hours (10–12) elapse before this first level is again reached.

From their investigations of a number of specimens shipped to them in the fresh state, and dried, and in preservatives the authors have found that fresh plants stored at ordinary temperatures without preservatives lose in 1 to 6 days up to as much as 83 per cent. of the HCN. If they are stored at refrigerator temperature the loss on maceration is great; 67 per cent. may be lost when fresh plants are kept in water to which chloroform has been added, in other cases the loss may be but slight in four days. It is this irregularity which makes the method so uncertain. Acids cause a rapid loss, salicylic less than others; alkalies cause a loss between 32 and 96 per cent., due to destruction of HCN rather than to inhibition of cyanogenesis. Only some 8 per cent. or less in a week is lost when alcohol is added from 10–25 per cent., but in 7–8 weeks 20 per cent. In high concentrations (50–95 per cent.) alcohol inhibited cyanogenesis.

The best preservative was aqueous solution of mercuric chloride added to the extent of 1 per cent. by weight for fresh plant; such showed no loss after storage for as long as six months, the optimum temperature for storage being 25°C. The article describes the technique for recovering HCN from samples so preserved; this is purely a chemical question and does not come within the scope of this *Bulletin*. Those interested in this aspect of the subject should consult the original. *H. H. S.*

EVANS (K. Leigh) & ARNOLD (L. E.). **Experimental Studies of Poisoning with Ackee** (*Blighia sapida*).—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Nov. 26. Vol. 32. No. 3. pp. 355–362. With 5 figs. on 1 plate.

This article indicates a big step towards the solution of the puzzling and fascinating problem of the toxic principle of the ackee (*Blighia sapida*). Thousands of lives have been lost by ackee poisoning in past years, as SCOTT showed in his monograph on the Vomiting Sickness of Jamaica, published in 1916. Since then deaths have been much fewer, but until the actual toxic agent or constituent is known and, if possible, isolated and tests devised to prove its presence in the human subject, killing by its means will, as it has in the past, escape detection. Hence this work of Drs. Leigh Evans and Arnold has a great medico-legal as well as a clinical and academic scientific value.

After repeating and confirming the experimental work of SCOTT and of CONNAL and RALSTON carried out more than twenty years ago [see this *Bulletin*, 1915, Vol. 6, p. 426; 1916, Vol. 7, p. 381; 1917, Vol. 10, p. 102; 1918, Vol. 12, p. 438], they have again demonstrated the peculiar fact that herbivorous animals require a much larger quantity of the fruit to kill them than do carnivores. Thus, whereas 1 gm. per kilo will kill a kitten, guineapigs will survive doses under 3·5 gm. per kilo.

The details of their confirmatory work, which was carried out with meticulous care and was essential to their pioneer investigations which

followed, are given in this article and it is want of space only that compels us to leave this aspect of the subject. Those interested in toxicology would be well repaid by a study of it. The important advance which the authors have contributed is in separating the constituents—saponin, fat and phytosterol—from the fruit and in showing the toxicity of the first of these. That the toxic principle might very likely be a glucoside was suggested long ago by SCOTT but merely on the empirical and negative grounds that the poison could not be obtained from the gastric contents or tissues or excreta of fatal cases and he inferred, therefore, that the toxic agent was some substance rapidly decomposed or changed on absorption.

Drs. Leigh Evans and Arnold describe the method they employed for separating the saponin from the ackee extract, prepared as for their preliminary animal experiments. Cases of ackee poisoning occur from November to March or even April, but much more commonly from December to February or March, and the authors have shown that in these, the colder months of the year, the saponin content is higher and the toxicity greater. They have demonstrated by carefully devised series of tests why the normal, naturally opened ackee is harmless, whereas the unopened fruit is highly toxic. The following tables, taken from their article, show these points more clearly than a long description :—

TABLE II.

Haemolysis Dilutions.

Tube number	1	2	3	4	5	6	7	8	9	10
Blood suspension cc.	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0
Saline cc.	2·95	2·9	2·8	2·7	2·6	2·5	2·25	2·0	1·75	1·5
Saline ackee extract cc.	0·05	0·1	0·2	0·3	0·4	0·5	0·75	1·0	1·25	1·5

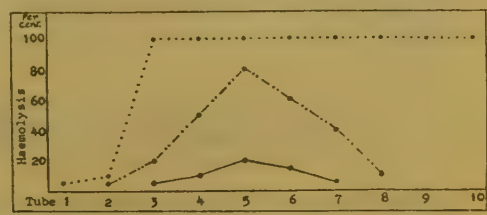
TABLE III.

HAEMOLYSIS IN ACKEE EXTRACTS.

Unopened ackee .....

Partly opened ackee embedded seeds ..—.—.—.—.—.—.

Opened ackee normal seeds————



Graphical expression of the results of haemolysis tests on extracts of ackee.

[Reproduced from the *Transactions of the Royal Society of Tropical Medicine and Hygiene.*]

" 1. The arillus of the unopened ackee is lethal to kittens with a dose of 1·0 gramme per 100 grammes of kitten weight when administrated intragastrically.

" 2. The arillus of the unopened ackee is lethal to guineapigs when a dose of 3·5 grammes per 100 grammes of guineapig weight is given subcutaneously or intragastrically.

" 3. In the partly opened ackee the arillus with embedded seed is lethal to guineapigs in the same dose as the arillus from the unopened ackee, while the arillus with normal seed is not lethal to guineapigs in this dosage.

" 4. This toxic property is cumulative when repeated sublethal doses are given at daily intervals.

" 5. The arillus of the fully opened ackee is not lethal to guineapigs.

" 6. The post-mortem findings, both in kittens and guineapigs, indicate an acute toxaemia affecting all organs with haemorrhages and fatty changes, chiefly in the liver and kidneys.

" 7. The ackee contains a saponin, which is haemolytic in some stages of the development of the fruit, and the toxic substance is very probably this saponin.

" 8. The saponin is strongly haemolytic in the arillus of the unopened ackee ; less so in the arillus with embedded seed of the partly opened ackee, being only slightly haemolytic in those with normal seeds ; while it is non-haemolytic in the arillus of the fully opened ackee.

" 9. The fat content of the arillus varies with the stage of development of the ackee. There is little fat in the unopened ackee, most in the arillus of the fully opened ackee. The arillus with the embedded seed contains less fat than the arillus with the normal seed in all stages of development.

" 10. The toxicity of the arillus of the ackee varies inversely with the fat (and phytosterol) content. This is as would be expected ; phytosterol fixing the saponin and rendering it non-haemolytic and, as a consequence, non-toxic.

" 11. There is apparently a seasonal variation in the toxicity and fat content of the ackee. In the colder months (December to March) the fruit contains less fat and is apparently more toxic than at other times.

" 12. The unsuitability of herbivorous animals for this particular investigation is appreciated, but, even with this handicap, the findings appear to open several avenues for further investigation. In view of the age and seasonal incidences, particularly in ' vomiting sickness,' immunological studies and experiments are being conducted to determine what part, if any, is played by photochemical and photodynamic action on the fat and phytosterol content and toxicity of the fruit."

[An admirable piece of work, which, it is hoped, will be followed to its logical conclusion—the finding of a test by which proof of poisoning by ackee may be established by definite chemical means and not merely, as hitherto, by the pathological and histological lesions produced.] *H. H. S.*

CURASSON (G.). Etat actuel de nos connaissances sur les plantes toxiques de l'A.O.F. [**Present-day Knowledge of Poisonous Plants of French West Africa.**]—*Bull. Comité d'Etudes Hist. et Scient. de l'A.O.F.* 1938. Apr.–June. Vol. 21. No. 2. pp. 149–173.

This is little more than a list of over a hundred plants regarded as poisonous in West Africa. A few words are added to each regarding its reputed toxicity. Most of them are known in other parts of the tropics. The information, when correct, is too meagre to be of much use and in the case of *Blighia sapida* with which the reviewer is best acquainted, the statements that it " causes the vomiting sickness in America," that " only the fibrous part adhering to the seeds is toxic " and that " the seeds are sometimes eaten roasted by Europeans " are at variance with fact, and the only other point mentioned, that the " powdered fruit is used for stupefying fish in the Gold Coast " is, to say the least, doubtful. *H. H. S.*

EARLE (K. Vigors). **Toxic Effects of** *Hippomane mancinella.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Nov. 26. Vol. 32. No. 3. pp. 363–370. With 2 plates. [20 refs.]

Hippomane mancinella, the manchineel tree, is found in the West Indies and along the coast of Central and South America. All parts of the plant are toxic ; raindrops falling on a person sheltering beneath it will cause irritation, and the fruit, somewhat like an apple, is inadvertently eaten by new arrivals, such as sailors going ashore after a voyage. As a rule one bite is enough, as it is pungent and disagreeable, but even that sets up smarting, salivation and soreness of the mouth ; if it is chewed before being ejected the buccal mucosa becomes swollen, blistered and desquamates. In short, on skin and mucosae the latex causes irritation and vesication, and, if swallowed, salivation, vomiting, meteorism, liquid stools with blood. The wood shows a handsome grain and polishes well, but local carpenters will not often use it because the sawdust causes cough, rhinitis, laryngitis, conjunctivitis and lachrymation. Treatment is purely symptomatic.

The latex is sometimes used empirically as a liniment, as a counter-irritant and, according to BODEAU, as an anthelmintic. [Though not included in the list of references, there is a brief account of this, together with a sketch of the leaves and fruit, in BYAM and ARCHIBALD's *Practice of Medicine in the Tropics*, Vol. 1, p. 778.] *H. H. S.*

VAN VEEN (A. G.). Kunnen peteh- boonen djenkolvergiftigingen veroorzaken ? [**Peteh Beans and Djenkol Poisoning.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1938. Oct. 18. Vol. 78. No. 42. pp. 2619–2621. English summary.

The djenkol bean, *Pithecolobium lobatum*, contains a poison, djenkolic acid, which causes symptoms of intense irritation of the urinary tract—renal pain, dysuria, perhaps anuria, necrosis and fistula [see this *Bulletin*, 1936, Vol. 33, p. 724]. The notion that the peteh bean, *Parkia speciosa*, might also be a cause probably originated in the fact that it has a similar odour of volatile sulphuric compounds. Analysis of these beans revealed, however, no trace of djenkolic acid, nor could any of it be found in the urine of those who had eaten them, whereas it is readily found and in considerable amount after five young djenkol beans had been eaten. *H. H. S.*

HAY (George Gray). **Amaas.**—*South African Med. Jl.* 1938. Sept. 10. Vol. 12 No. 17. pp. 639–642. [Summary appears also in *Bulletin of Hygiene.*]

The native settlers in the Zoutpansberg penetrated the country in two distinct groups. The northern group showed outbreaks of a disease resembling smallpox, though the natives denied that it was so and called it amaas, menzi, Kimberley ziekte and other names, while the southern group showed cases of typical smallpox. In the author's experience amaas presents the following differences from and resemblances to classical smallpox.

1. Amaas is specially a disease of the winter months, whereas smallpox occurs in hot as well as in cold climates.

2. The chief characteristic of amaas is its very slight degree of infectivity.

3. Amaas never kills of itself, but it may be a cause of death in debilitated persons, especially in those suffering from respiratory disease.
4. The distribution of the rash in amaas resembles that of smallpox.
5. Prodromal rashes may occur in both diseases.
6. The author has never seen amaas show the slightest tendency to develop into true smallpox.
7. Amaas can be controlled by vaccination but it is important that the vaccine lymph should contain strains of the amaas type.

In conclusion the author maintains that for the successful control of an outbreak district surgeons need the support of the district officials and the public should be invited to cooperate. *J. D. Rolleston.*

KING (C.) & DE ROZARIO (K. A.). **Prontosil in Smallpox.**—*Jl. Roy. Army Med. Corps.* 1938. Dec. Vol. 31. No. 6. pp. 404–406. With 1 chart.

Prontosil rubrum (3 tablets) was given to a patient with smallpox when the vesicles were becoming turbid, and the dose increased to 7 tablets on the following day, when the eruption became pustular. The temperature fell to normal the next day, no secondary rise of temperature occurred and the patient made an uninterrupted recovery. The diagnosis was not in doubt.

[It is not stated whether, or in what doses, prontosil was administered after the second day of exhibition.] *C. W.*

WU (Ying). Zur Pathogenitäts- und Infektionsfrage der *Trichomonas vaginalis.* [**Pathogenicity and Incidence of** *Trichomonas vaginalis.*] —*Zent. f. Bakt.* I. Abt. Orig. 1938. June 20. Vol. 141. No. 8. pp. 411–423. [58 refs.]

Examining the vaginal secretion of a number of women in Hamburg the author has found trichomonas to be present as frequently in the healthy as in those suffering from vaginitis. Direct examination of the secretion revealed nearly as many infections as did cultural methods. The findings did not afford any evidence of the primary pathogenicity of the flagellate. It had been suggested that infections had been contracted through bathing in the river Elbe, but the author found that the flagellates survived only a short time in the water from the river.

C. M. Wenyon.

VARELA ZEQUEIRA (Roberto). Vaginitis por tricomonas. [**Vaginitis due to Trichomonas.**]—*Rev. Med. Trop. y Parasit.* Habana. 1938. Mar.–Apr. Vol. 4. No. 2. pp. 69–78. [23 refs.]

In this paper the author, who has found trichomonas in 54 of 470 patients coming for treatment of leucorrhoea, had used successfully the powder recommended by GELLHORN, which consists of a mixture of equal parts of kaolin and sodium bicarbonate to which is added 12·5 per cent. of stovarsol. The powder is administered locally by means of an insufflator. *C. M. W.*

CH'U (Ying-Chang) & FORKNER (Claude E.). **Errors in Erythrocyte Counts due to Hayem's Solution—avoided with Gowers' Solution.**—*Jl. Lab. & Clin. Med.* 1938. Sept. Vol. 23. No. 12. pp. 1282–1293. With 7 figs. [17 refs.]

Hayem's diluting fluid, with the blood of some patients, produces a coarse precipitate to which many erythrocytes adhere, and this may introduce a significant error into red cell counts; the phenomenon is especially marked in cases of kala azar, cirrhosis of the liver, pneumonia, nephritis and other disorders. The authors recommend, as the most satisfactory diluting fluid, Gowers' solution, made according to the formula of Mallory and Wright, which is given as sodium sulphate 12·5 gm., acetic acid 33·3 cc. and water 200·0 cc. *F. Murgatroyd.*

MARENZI (A.) & LIDA (E.). Etude comparative des méthodes de détermination de l'hémoglobine. [**Comparative Study of Methods of determining Haemoglobin.**]—*C. R. Soc. Biol.* 1938. Vol. 129. No. 34. pp. 1267–1269.

Determinations of the haemoglobin in various samples of oxalated venous blood were made by the following methods: by the carbon monoxide combining power according to van Slyke and Hiller; by the oxygen capacity according to Sendroy; by determining the total iron according to Wong; by the method of Bürker; with the Zeiss-Ikon haemometer; by Newcomer's method; and with the Hellige haemoglobinometer. The estimation of iron agreed strictly with the gasometric methods; the results obtained with the method of Bürker deviated a little but were still satisfactory. The Zeiss-Ikon and Newcomer's methods gave values constantly in excess, whereas those obtained with the Hellige haemoglobinometer were always too low. Similar results were obtained with diluted blood, but when the concentration of haemoglobin was very low colorimetry became difficult where fixed scales were used as in the Bürker, Zeiss-Ikon, Newcomer and Hellige methods. Statistical analysis of the results of ten determinations by each method on the same specimen of blood showed minimal differences with the gasometric and ferrometric methods; with the apparatus of Zeiss-Ikon and with the method of Bürker the discrepancies were rather greater; with the Hellige and above all with the Newcomer method the results were still less satisfactory. The ferrometric method of Wong is to be recommended and can be used for the recalibration of other haemometers. *F. Murgatroyd.*

KENNEDY (Walter P.). **Haemoglobin and Erythrocyte Standards in Iraq.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Jan. 28. Vol. 32. No. 4. pp. 511–518. With 1 fig. [45 refs.]

The mean of the erythrocyte counts for 527 healthy persons, British airmen and Iraqui nationals, was 5·34 millions per cmm. [in the abscissa of the histogram for erythrocytes the figure 5·4 should be 5·2], and no significant difference was found between the British and Iraqui groups. A table is given summarizing the results of other investigations on the erythrocyte counts in adult males, and, after a statistical discussion, the conclusion is reached that, excluding observations in regions of

high altitude, there is no evidence of a geographical variation in erythrocyte counts if the population is carefully selected for a high health standard.

Haemoglobin determinations of 428 individuals of the same group gave a mean value of 16·73 gm. per 100 cc. blood. The Sahli acid haematin method was chosen, the instrument being calibrated by the van Slyke method. The results are compared with those of other workers and two possible explanations are suggested for the high mean obtained in Baghdad during summer: one is the very high health standard of the selected population and the other the relative anoxaemia due to the air density in July which is equivalent to the density in winter at 5,000–6,000 feet.

The author emphasizes the necessity for a proper appreciation of differences arising from technical or statistical sources in haematological determinations. The calibration of instruments is particularly important since as much as 20 per cent. difference may be found between instruments of the same type. *F. Murgatroyd.*

NAPIER (L. Everard) & MAJUMDAR (D. N.). **Haematological Studies in Indians. Part IX. The Analysis of the Haematological Findings in 57 Cases of Anaemia in Pregnant Tea-Garden Coolie Women with Special Reference to the Results of Treatment.**—*Indian Jl. Med. Res.* 1938. Oct. Vol. 26. No. 2. pp. 541–595. With 37 graphs & 1 fig. [16 refs.]

The anaemias of pregnant tea-garden coolie women can be divided into two groups. One, the iron deficiency group, is slightly more common in primigravidae but may occur in any pregnancy, or post-partum. The typical blood picture is microcytic and hypochromic, the cells have a low haemoglobin concentration, anisocytosis is the rule, frequently there are normoblasts, the reticulocyte count is about 2 per cent. and there is usually a slight but distinct leucocytosis. The condition is not associated with low gastric acidity and the indirect van den Bergh reaction is usually negative. All patients had hookworm infection but there is little correlation between the degree of the infection and the anaemia, and there is no correlation between splenic enlargement and the anaemia. There is a good response to iron therapy in the early months of pregnancy and post-partum, but in the latter months the response may be only slight until the uterus is empty, when rapid improvement occurs. This anaemia seems to be an exaggeration of the anaemia of the normal population which, living at the lowest level of iron balance due to low intake and increased loss by hookworm disease, has on a whole a low level of haemoglobin associated with a small pale red cell. Although this is perhaps not the whole explanation the additional demand for iron during pregnancy or the extra loss of blood at parturition are determining factors in the development of the frank anaemia.

The second type, the Marmite-liver-deficiency group, occurs in any, but especially in the third and fourth, pregnancies; and becomes established at any month or post-partum, but most frequently in the third trimester of pregnancy. The typical blood picture is hyper- or orthochromic and macro- or normocytic, there is some anisocytosis and poikilocytosis, normoblasts and erythroblasts are seen in the peripheral blood but rarely megaloblasts, the reticulocyte count is

low and the leucocyte count is normal. There is no association with achlorhydria although there is an inconclusive association with a slightly lowered gastric acidity, the van den Bergh reaction is usually positive, and neurological symptoms are completely absent. There appears to be a definite correlation between the anaemia and splenic enlargement which, with the positive van den Bergh reaction, suggests chronic malaria as an important aetiological factor. There is a good response to Marmite by the mouth or to Campolon by intramuscular injection but in the later stages of pregnancy the response may be counteracted or delayed, particularly with Marmite, until the uterus is empty.

A dietary survey of the population by Dr. MITRA showed that although the total calories were not unduly low they were mainly derived from carbohydrates ; the total protein was low and the animal protein negligible, while the total fat was also low and mostly of vegetable origin. The calcium intake was exceptionally low and the available iron was probably at the border line. The intake of vitamins A, B-complex and C were low, although apparently A and B were not actually deficient as judged on most standards. Recent work suggests that calcium plays some part in the absorption and utilization of iron, and the striking calcium deficiency together with the vitamin C deficiency may be of significance in the production of the hypochromic anaemias. The hyperchromic type may result from a dietary deficiency, or possibly a minor toxaemia, conditioned by the extra demands of a foetus in an individual on a border line diet, and by chronic malaria.

F. Murgatroyd.

BEVERIDGE (A. J.). **The Blood Picture in Singapore.**—*Jl. Roy. Army Med. Corps.* 1939. Jan. Vol. 72. No. 1. pp. 1–11.

Twelve healthy soldiers aged 20–30 years newly arrived at Singapore in October 1937, were examined under standardized conditions at monthly intervals until March 1938. The mean values for all the examinations were erythrocytes 5,512,000 per cmm., leucocytes 7,551 per cmm. and haemoglobin 15·135 gm. per 100 cc. ; the differential white count gave polymorphonuclears 56·876 per cent., lymphocytes 37·676 per cent., eosinophils 1·963 per cent., basophils 0·339 per cent. and mononuclears 3·164 per cent. Total erythrocytes and leucocytes were much in keeping with the mean averages of a number of text-books, but the haemoglobin was 16 per cent. below the mean average ; the individual variations in haemoglobin were, however, considerable and there was no constant or progressive loss. Compared with text-book means the differential counts showed relatively low mean values for polymorphonuclears, eosinophils, basophils and mononuclears, and a relatively high mean value for lymphocytes. It is not possible to draw any conclusion regarding these differences, in view of the relatively small number of observations and the wide variations in counts obtained either in the same individual or in different individuals at the same time. The author notes that the leucocyte count of any individual may fluctuate during 24 hours by as much as 100 per cent., that under ideally standardized conditions it may vary by 30 per cent., and that the " fortuitous error " of counting a single sample may be 30 per cent. Those remarks demand the attention of all engaged in haematological work and indicate that considerable caution is needed in interpreting haematological data. *F. Murgatroyd.*

McLEAN (John A.). **Haematocrit Determinations in Normal and Abnormal Blood.**—*Med. Jl. Australia.* 1938. Nov. 5. 25th Year. Vol. 2. No. 19. pp. 770–774. With 1 fig.

Haematological determinations in a series of fifty-five normal persons were made in Melbourne, Australia. Venous blood was used, 5 cc. being collected in a small bottle containing 6 mgm. ammonium oxalate and 4 mgm. potassium oxalate in order that changes in corpuscular volume might be minimal.

The mean values obtained are shown in the following table :—

	Men	Women
Haemoglobin in gm. per 100 cc.	15·4	13·7
Erythrocytes in millions per cmm.	5·1	4·7
Corpuscular volume in cc. per cent.	45·1	42·0
Corpuscular volume in cμ	89	88
Corpuscular haemoglobin in γγ*	31	29
Corpuscular haemoglobin concentration as percentage	34	32

These values are compared with certain others obtained in the United States of America and in England, and the differences are seen to be relatively slight.

A number of cases of various blood diseases was then examined. Sixteen patients classified as suffering from hyperchromic macrocytic anaemia gave mean corpuscular volumes ranging from 114 cμ to 170 cμ, the average value being 138 cμ; mean corpuscular haemoglobin values ranging from 38γγ to 58γγ with an average value of 47γγ; and mean corpuscular haemoglobin concentrations from 29 per cent. to 45 per cent., the average value being 35 per cent. Fifteen patients suffering from hypochromic anaemia gave mean corpuscular volumes ranging from 62 cμ to 81 cμ, the average being 73 cμ; mean corpuscular haemoglobin values from 13 γγ to 21 γγ, with an average of 17 γγ; and mean corpuscular haemoglobin concentrations varying from 17 per cent. to 27 per cent. with an average of 22 per cent. Values for a large group of secondary anaemias of various origins are given. In two cases of acholuric jaundice where the mean diameter of the red cells is less than normal, the mean corpuscular volume fell within normal limits and in a third but slightly below, following the spherocytosis. The mean corpuscular volume in three cases of polycythaemia was within normal limits; the mean corpuscular haemoglobin and mean corpuscular haemoglobin concentrations in two of the cases were slightly below normal. *F. Murgatroyd.*

GROSS (M.). Un nouvel hémogramme. [**A New Haemogram.**]—*Schweiz. Med. Woch.* 1938. Nov. 19. Vol. 68. No. 47. pp. 1272–1274.

Nine vertical lines are used to represent respectively the total leucocytes per cmm. and the totals of the various subdivisions according to the classification of Schilling. Two parallel horizontal lines are then drawn to cut the vertical lines at points which are given values corresponding to the maximum and minimum numbers of the cells in normal blood, and the scales so determined are continued up the respective vertical lines. In any given count the values obtained are

* 1γγ = 1 micromicrogramme = 1×10^{-12} gm.

joined by a curve which the author feels represents the leucocyte formula more clearly and more strikingly than mere figures. To plot this curve absolute values of the various cells are required and in order to obviate calculation of these figures from the percentage count the author has a simple nomogram. This consists of three vertical lines, scaled according to logarithmic series; the left line represents totals and the right percentages, so that a straight line joining any two such values cuts the third vertical line at a point corresponding to the absolute count for such percentage and total. The author also gives a nomogram connecting total red cell count, haemoglobin value and colour index. *F. Murgatroyd.*

PELLICCIOTTA (Raffaele). Influenza del clima tropicale sulla formula leucocitaria e schema di Arneth nell'uomo sano. [**The Effect of Tropical Climate on the Differential Leucocyte and Arneth Counts.**] —*Policlinico.* Sez. Prat. 1938. Oct. 3. Vol. 45. No. 40. pp. 1805–1808, 1811–1814.

In continuation of his studies on the effect of the sudden change of climate from Italy to Abyssinia on Europeans in normal health [this *Bulletin*, 1938, Vol. 35, pp. 839 and 845], the author now reports the results of the differential leucocyte and the Arneth counts carried out twice on 34 normal individuals. The examinations were made on blood taken, first, on board ship on entering the Red Sea, and second, about one month later in Diredaua. Compared with the first examination, the second showed that in the majority there was relative polymorphonuclear neutrophil leucopenia and relative lymphocytosis. The difference in these percentages is not great but appears to be statistically significant. There is a shift to the left in the Arneth index. These changes may persist for some months and although improvement later takes place the condition is not usually restored to the normal for temperate climates, but corresponds with that found in the natives. *C. W.*

MAEGRAITH (Brian). **The Polynuclear Count in the Australian Aborigine.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1938. Sept. Vol. 16. Pt. 3. pp. 241–244. With 1 fig.

Arneth counts on blood films from forty-seven apparently healthy pure-blooded Australian aborigines of both sexes gave the following mean percentages: I 33·5, II 42·3, III 20·4, IV 3·5 and V 0·3 with a weighted mean of 1·95. This shows a marked shift to the left compared with the mean of whites living in England or Melbourne and is in keeping with the results of other polynuclear counts done on both natives and white people living in hot climates. [See also this *Bulletin*, **1931**, Vol. 28, p. 837.] *F. Murgatroyd.*

SAINT ETIENNE (J.). Sur un cas d'eosinophilie massive. [**A Case of "Massive Eosinophilia."**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. May. Vol. 18. No. 5. pp. 532–538. [Summary appears also in *Bulletin of Hygiene.*]

The author states that in the hospital of Lanessan, Tonking, he has been struck by the number of patients showing a high eosinophilia. The case here detailed is certainly peculiar and worth recording.

A boy of 12 years who had been in good health until December 1936, when he sustained a fracture of the right tibia and luxation of the head of the left humerus with fracture of the surgical neck in a motor accident. The first fracture healed readily, the second necessitated resection of the head of the humerus. He was in hospital for five months with oscillations of temperature. Examinations of blood, urine, of discharge from the wound and serological tests yielded nothing positive.

In January 1937, a differential leucocyte count gave 83 per cent. polymorphonuclears and 3 per cent. eosinophiles. In March, he was noticed to be pale, and for the preceding month had complained of being easily tired. The liver was enlarged and the spleen was palpable, but there was no gland enlargement. On 14th March, red cells numbered 4,340,000 and white 22,300 per cmm., 82 per cent. of the latter being eosinophiles. This being unexpected the count was repeated and red cells were 4,620,000, white 35,300, eosinophiles 80 per cent. In the next two months the red ranged up to 5,260,000 and the white between 52,000 and 14,600 (the last in May) and eosinophiles between 83 and 55 per cent. (the lowest, also in May, when the general condition had improved).

Repeated examinations failed to reveal any definite cause for this remarkable esoinophilia, except for a few Trichuris ova, there were no signs of helminthic infestation; the Casoni test for hydatid was negative. There was no skin disease, no allergic condition (asthma, etc.), no myeloid leukaemia. By exclusion there remained two hypotheses: an "eosinophilic leukaemia," a name proposed by AUBERTIN and GIRON in 1921; or some autonomous affection of some blood-forming organ or tissue, a primary disease of the spleen (noted by CHALLIER and LEVRAT). There was a little splenic enlargement in this patient and some marrow disturbance resulting from the fracture of the neck of the humerus, but this seemed inadequate to account for the blood changes. The author consequently designates it as "essential massive eosinophilia" until something more positive is discovered regarding its aetiology. [See also PIRERA, *Bull. of Hyg.*, 1939, Vol. 14, p. 224.] *H. H. S.*

FAIRLEY (N. Hamilton), BROMFIELD (R. J.), FOY (Henry) & KONDI (Athena). **Nutritional Macrocytic Anaemia in Macedonia. A Preliminary Report.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Aug. 25. Vol. 32. No. 2. pp. 132–173. [25 refs.] Discussion pp. 173–182 [WILLS (Lucy); VAUGHAN (Janet); NAPIER (L. E.); McROBERT (G. R.); FRASER (G.); FAIRLEY (N. Hamilton)].

During a previous study of blackwater fever the authors were impressed by the frequency and severity of the anaemia encountered in Macedonia. The anaemia, which persisted despite antimalarial treatment and iron medication, was in a number of cases megalocytic, and was regarded as falling into the category of tropical macrocytic anaemia. This year the authors studied the situation in more detail and the present paper records a wealth of haematological observations which they summarize as follows:—

"1. It is suggested that the title 'tropical macrocytic anaemia' be changed to 'nutritional macrocytic anaemia,' and that two sub-groups be recognized: (1) non-haemolytic, (2) haemolytic.

"2. In Macedonia nutritional macrocytic anaemia is predominantly of haemolytic type. It is prevalent amongst the refugee peasants, occurring especially during pregnancy, and is found in patients coming into hospital for malaria and blackwater fever.

"3. Males as well as females are affected; it is most common in females during the child-bearing period owing to the added nutritional demands of pregnancy and lactation.

"4. The haematological and biochemical data and the clinical findings in a group of thirty-seven cases of nutritional macrocytic anaemia associated with pregnancy are analysed and discussed.

"5. The red cell counts of three infants born of severely anaemic mothers suffering from this disease showed little if any deviation from the normal, being 5,600,000, 6,730,000 and 6,980,000 erythrocytes per cmm. The mothers' counts were 1,293,000, 1,145,000 and 922,000 erythrocytes per cmm. respectively.

"6. A study of sternal marrow smears indicates that there is a panmyelopathy characterized by erythropoiesis with megaloblastic degeneration, the production of pathological precursors of the white cell series, and an abnormal condition of the megakaryocytes.

"7. This state of affairs is reflected in the peripheral blood by a megalocytic anaemia, a tendency to leucopaenia with a shift to the left and a decrease in the platelet counts.

"8. Purpuric manifestations are seen in approximately 25 per cent. of cases and are associated with thrombocytopaenia. The count in five purpuric cases averaged 29,270 platelets per cmm.

"9. There is no evidence of vitamin C deficiency in the diets of these patients, and the thrombocytopaenic purpura is regarded as originating in a pathological condition of the marrow.

"10. In a number of cases of tropical macrocytic anaemia of haemolytic type an increased mean corpuscular volume was found to be associated with a normal mean corpuscular diameter and an increased mean corpuscular thickness.

"11. These data indicate that a condition of megalospherocytosis exists, but before this can be accepted as correct further observations are necessary to eliminate the possibility of undue corpuscular shrinkage with Jenner staining.

"12. The pathology of two cases is described in detail and evidence is presented that the splenomegaly resulted from chronic malaria, and the enlarged 'nutmeg' liver from chronic venous congestion due to heart failure secondary to anaemia.

"13. Microscopic sections showed a very marked decrease in the Malpighian corpuscles and lymphoid tissue in the spleen, and considerable activity and hypertrophy of the R.E. cells in both spleen and liver.

"14. Malarial pigment was demonstrated in the Küpffer cells of the liver and the endothelial cells of the spleen; haemosiderin, which was present in considerable quantity in the liver and distributed mainly in the outer zone of the lobules adjacent to the portal canals, was less evident in the spleen.

"15. The diets of the refugee population in general and of our patients in particular were deficient in sources of animal protein and fat, such as meat, chicken, milk and butter, and were similar in many respects to the diets of people in the tropics who develop tropical macrocytic anaemia.

"16. The non-haemolytic type of nutritional macrocytic anaemia is rare in Macedonia, but when it occurs uncomplicated dietary deficiency appears to be the basis of the condition.

"17. In the common haemolytic type some additional haemolytic factor is implicated. It is suggested that this is not a direct parasitic effect on the red cell, but is due to the phagocytosis of abnormal red cells derived from a pathological marrow by the R.E. system which becomes activated and hypertrophied as a result of chronic malaria infection."

In the subsequent discussion Dr. Lucy WILLS suggested that the nutritional deficiency was some factor distinct from the liver principle and that it would be a mistake to fix attention too closely on sources of liver principle itself or of Castle's extrinsic factor. Although agreeing with the theory of a nutritional deficiency she pointed out that experimentally macrocytic anaemia with megaloblastic marrow can result from haemolysis. Discrepancy between Price Jones curves and mean corpuscular volume was probably a matter of staining but the effect of increased bilirubinaemia was to be considered. Dr. Janet VAUGHAN did not think the discrepancy was due to technique and found it associated with increased fragility in certain anaemias of pregnancy as in acholuric jaundice. Dr. L. E. NAPIER remarked that in India microcytosis, possibly due to diet or worms, was common and that anaemias which might elsewhere be termed normocytic represented there macrocytic anaemias. He had also concluded that macrocytic anaemia was due to diet and malaria. Lt.-Col. G. R. McROBERT pointed out that histamine-resistant achylia associated with macrocytic anaemia may become normal after treatment and stressed the importance of differentiating such cases from true pernicious anaemia. Dr. WILLS added that histamine-resistant achlorhydria may be associated with deficiency of vitamin B_1 which may be corrected by administration of marmite or liver. Dr. G. FRASER emphasized the gravity of nutritional anaemia complicated by malaria in Assam, its resistance to treatment and its grave prognosis.

F. Murgatroyd.

CHAUDHURI (Sujata) & MANGALIK (Vanmali). **Idiopathic Hypochromic Anaemia. Its Aetiology, Diagnosis, Treatment and Report of Four Such Cases.**—*Jl. Indian Med. Assoc.* 1938. Nov. Vol. 8. No. 2. pp. 78–85. [27 refs.]

This paper gives a summary of iron deficiency anaemia and describes in detail four cases. The authors point out that chronic iron deficiency, especially in the face of increased demands for iron as happens particularly in women, is responsible for a good deal of chronic ill-health, and that this type of anaemia is far more common in India than is generally believed. They deprecate uncritical and wasteful treatment with liver preparations in anaemias which can be cured comparatively cheaply by iron. *F. Murgatroyd.*

SCHRETZENMAYR (A.) & LANCASTER (R. L.). **Sternal Puncture, with Special Reference to its Application in Tropical Diseases in South China.**—*Jl. Trop. Med. & Hyg.* 1938. Nov. 1. Vol. 41. No. 21. pp. 341–343.

Most of the material of this paper has been previously published elsewhere and has been reviewed in this *Bulletin* [1938, Vol. 35, p. 849]. The present paper adds that in smallpox the typical changes in the bone marrow consist of a myelotic reaction combined with an increase of the reticulum and plasma cells. *F. Murgatroyd.*

SHUKERS (Carroll F.), LANGSTON (William C.) & DAY (Paul L.). **The Normal Blood Picture of the Young Rhesus Monkey.**—*Folia Haematologica.* 1938. Vol. 60. No. 4. pp. 416–424. [23 refs.]

The paper describes the technique employed and the results obtained in studying the blood pictures of nineteen young healthy rhesus

monkeys (*Macaca mulatta*) maintained for relatively long periods under standardized laboratory conditions. For each blood constituent approximately one hundred and fifty determinations were made. The maximum and minimum values obtained give a false idea of the dispersion of the data for healthy animals as few determinations fell near the extremes and most of the results were grouped closely around the mean. The middle 68 per cent. of the data fell within the following ranges, which are tentatively suggested as normal for immature animals of this species: volume of packed cells 36–44 per cent.; haemoglobin 10·9–13·5 grams per 100 cc.; erythrocytes, 4,600,000–5,800,000 per cmm.; reticulocytes, 0·5–0·7 per cent.; leucocytes, 9,700–20,500 per cmm.; neutrophils, 20–52 per cent.; lymphocytes, 44–74 per cent.; platelets, 318,000–623,000 per cmm.; and clotting time 32–124 seconds.

A table which summarizes the results obtained by previous workers is given, and the paper is of value in view of the use that is now being made of the rhesus monkey for experimental purposes and particularly for haematological studies, since the haematopoietic system of these animals behaves in a manner remarkably similar to that of man.

F. Murgatroyd.

RIVOALEN (A.). Le rôle du système réticulo-endothélial dans les maladies coloniales, infectieuses et parasitaires. [**The Reticulo-endothelial System in Infectious and Parasitic Diseases.**]—*Les Grandes Endémies Tropicales.* 1938. Vol. 10. pp. 76–97.

SIMMONS (James Stevens). **The United States Army's War in the Air against the Mosquito-borne Diseases.**—*Amer. Jl. Med. Sci.* 1938. Aug. Vol. 196. No. 2. pp. 153–167. With 3 figs. (1 map). [47 refs.]

This is a review of mosquito-borne diseases so far as they occur in the regions in which the United States Army normally operates. The control of these diseases (yellow fever, dengue, malaria and equine encephalomyelitis) is viewed particularly from the standpoint of the military authorities. Troops may be called upon to operate in regions where "jungle yellow fever" is prevalent and therefore obtain no protection from the usual methods of control of *Aëdes aegypti*. The cost of controlling *Aëdes* is such that it is not practised in regions where yellow fever is absent, such as the Philippines; yet an outbreak of dengue might jeopardize the success of a campaign. In the Panama Canal zone, although the incidence of malaria among the coloured employees has remained at about 16 per thousand for the last 20 years, the incidence among the troops in that zone is twice or three times as great. This is attributed to lack of resistance and to the army posts being located nearer to the unsanitated jungles. The conclusion is reached that specific prophylactic agents, either drugs or vaccines, are more suited for military purposes than the elimination of the insect vectors.

V. B. Wigglesworth.

HALL (Maurice C.). **The Bedbug. Its Relation to Public Health, its Habits and Life History, and Methods of Control.**—*Public Health Rep.* 1937. Supp. No. 129. 7 pp.

This is a short account of the biology, habits and control of the bed-bug, *Cimex lectularius* L.; there is little to indicate that the

author has studied the more recent literature on the insect, and the report is, to say the least, naïve. The importance which is apparently attached to the rôle of *C. lectularius* in disease transmission is scarcely warranted by the present uncertain knowledge of the status of this insect as a natural vector.

Some errors in the report occur in the following statements :—

"*Cimex hemipterus*, normally a parasite of birds and bats in the Old World . . . . sometimes becomes a parasite of man." *C. hemipterus* (*rotundatus*) is, of course, as great a pest of man as *C. lectularius*.

"Checking development by starvation may result in additional moulting periods."

"Feeding and developing practically cease at 50°F." Hatching and moulting cease at 56°–57°F. (13·5°C.).

"The most favourable temperatures for activity are between 60° and 98°F." The temperatures which are most favourable lie between 64° and 82°F. ; and the author himself states 9 lines above that large numbers of the bugs are "killed by temperatures of 96° to 100°F. or more, when accompanied by fairly high degrees of humidity." Nothing is known about the effect of humidity over this temperature range, however, although MELLANBY (1935) has shown that at 104°F. (40°C.) and 111·3°F. (44°C.) with exposures of 24 and 1 hours respectively humidity had no effect.

"Fumigation by means of burning sulphur is also very effective." Sulphur fumigation, although widely used, is not very reliable, and has as many critics as advocates.

C. Johnson.

Ho (Ch'i). **The Significance of the Female Terminalia of House-Flies as a Grouping Character.**—*Ann. Trop. Med. & Parasit.* 1938. Oct. 12. Vol. 32. No. 3. pp. 287–312. With 13 figs.

The precise identification of "house-flies," *i.e.*, *Musca domestica* and its close relatives, is exceedingly difficult : it is also important because different members of this group breed in different ways and are not equally important in hygiene. The inherent difficulties of identifying these insects have been by no means diminished by some of the papers written on the subject.

The author of the present paper takes the view that the most fundamental differences in the genus *Musca* relate to reproduction. He calls attention to the three types already familiar ; in one the female lays batches of rather small eggs ; in the second she lays larger eggs with pedicels, a small number at a time ; in the third she deposits single larvae which have already reached the second or even third stage. The author finds corresponding differences in structure in the terminal segments of the female, and bases his classification of the species on these characters. Whether the classification and points of difference will "work" time alone can show, but it appears that the system is reasonable and the present paper sound.

P. A. Buxton.

TAYLOR (Frank H.). **Intermediary Arthropod Hosts and Mechanical Carriers of Human Disease in the Australian Region.**—*Health.* Canberra. 1938. Aug. Vol. 16. No. 8. pp. 72–82. With 1 map.

MORIOKA (Koichi). **Experimental Studies on the Biological Behaviours of *Trichomonas hominis*. Part III. The Influence of Temperature, Oxygen and Various Additional Substances on the Rate of Growth and Vitality of *Trichomonas hominis* in Tanabe's Medium. Part IV. The Phenomena of Increasing and Diminishing Phases of Multiplication of *Trichomonas hominis*, of Stimulated Nutrition, and the Changes in Viscosity of the Culture Medium. Part V. Effects of Various Osmotic Pressures on Food Ingestion by *T. hominis*. Part VI. On the Vital Staining of *Trichomonas hominis*. Part VII. The *Trichomonas hominis* and its Relation to the Intestinal Bacteria; with Reference to the Influence of Trypanotoxin and Bacteriophage on the Parasite. Part VIII. The Fermentation of Carbohydrates. Part IX. The Production of Hydrogen Sulphide by *T. hominis*. Part X. The Ability of *Trichomonas hominis* to produce Indole.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1938. Apr. Vol. 37. No. 4 (397). [In Japanese pp. 635–647; 649–656; 658–668. With 8 charts; 671–677. English summaries pp. 648; 657; 669–670; 677] and May. No. 5 (398). [In Japanese pp. 838–849. [15 refs.]; 851–860. With 4 charts. [14 refs.]; 862–865. [13 refs.]; 866–868. English summaries pp. 850; 861; 865; 869.]

In these investigations the author studies the growth and vitality of *Trichomonas hominis* in Tanabe's medium under varying conditions. It was found that the addition of haemoglobin, mucin and starch stimulated the growth. It was also noted that during the course of subculture every two days there were periods of active growth, "florescent period," followed after an interval of 14 to 16 days by a period of poor growth, "decadent period." These periods occupied 4 to 6 days.

During the active growth period the culture medium became viscous as a result, presumably, of a mucin-like substance secreted by the flagellates. The effects of variations in concentrations of salts (sodium chloride, potassium chloride, calcium chloride and sodium citrate) were also studied. It was found that the activity as judged by the number of starch grains ingested was greatest when the salt concentration was a little below that of tissue fluids. At other concentrations the vitality of the flagellates was lowered.

In their reaction to vital strains of which 35 were tested on the flagellates it was found that the basic dyes were those which gave a positive result. The granules taking up the stain were mostly those in the anterior part of the organisms. The various bacteria associated with the flagellate were investigated as regards any influence they might have on the cultures. *Bact. faecalis alkaligenes* exerted a stimulating influence on the cultures, as also did a number of bacteriophages, including those of *Bact. coli commune*, *Bact. typhosum* and certain dysentery bacilli.

By comparing the changes which take place in certain media in which bacteria are growing with those which occur in exactly similar media when the bacteria are accompanied by trichomonas, it was determined that the flagellates stimulate the decomposition of various sugars added to the medium and in other media give rise to sulphuretted hydrogen and indol.

C. M. W.

ESCOMEL (Edmundo). La tricomonosis vaginal, vesical, intestinal y gingival. Su terapeutica especifica. [**Specific Treatment of Vaginal, Vesical, Intestinal and Gingival Trichomonas Infections.**]—*Gac. Med. de Caracas.* 1938. Mar. 31. Vol. 45. No. 6. pp. 86–93.

This is a general article on the various trichomonas infections of man and the methods of treatment which have given successful results in the author's experience. *C. M. W.*

HORN (Arthur E.). **Notes on Public and Private Health Control in Tropical Africa.**—VIII Convegno "Volta" Roma 4–11 ottobre 1938. 10 pp.

It is not yet possible to tell whether races indigenous to temperate zones can successfully and with unimpaired vigour inhabit the tropics for generation after generation, though evidence from Central America and Northern Australia indicates that it may be possible. Climate is a factor beyond the power of man to change in the present state of knowledge, but in Tropical Africa the control of the associated endemic and epidemic diseases is essential to successful colonization.

A brief description of the general medical organization adopted in the British Dependencies in Africa is given, and mention is made of the medical education of natives and of the Health branch with its subdivisions designed to concentrate on diseases of special importance. The efforts of the Medical Departments must be seconded by other resident Europeans and for this reason officials recruited in Britain must not only be physically fit, but also, as part of their preliminary training, must be made familiar with the nature of the diseases and insanitary conditions they may meet. The advantages of local and home leave and of sufficient exercise and recreation are emphasized.

European women, whether employed as nurses, teachers, etc., or carrying out their domestic duties as wives of residents, can maintain as good health as men, but in only a few parts of Tropical Africa do children remain beyond the age of 10 or 12. Pregnancy is more trying than in temperate climates.

Neurasthenia is not uncommon and may result from overwork and ill-balanced conditions. Modern facilities, however, of travel, communication and contact through broadcasting are improving the lot of colonial officers and though the problem of permanent settlement is not yet solved, the present results justify confidence in the future.

C. W.

WALSH (Groesbeck) & POOL (Robert M.). **Disease and the Negro.**—*Amer. Jl. Med. Sci.* 1938. Aug. Vol. 196. No. 2. pp. 252–261.

A footnote to this paper notes "This contribution is the foreword of a book of the same title upon which the authors are at present engaged."

Attention is called to the observed variations in form, movement and structural differences, etc., between the negro and the white man. The diseases of the two races are said not to differ in any essential detail and it is added that during 18 years of diagnostic research the normal findings were for all practical purposes identical and provided no evidence of true racial differences. Yet trained observers have noted that disease patterns of the two races do appear to differ in many respects, and in an attempt to discover whether any common

cause could be held responsible for the increased frequency of some diseases and the diminished frequency of others among coloured patients, a special investigation was undertaken. In view of the fact that clinical and laboratory records failed to produce evidence of true racial differences in regard to disease it was believed that former investigations were founded on too narrow a base since the mental aspect of the problem had not received the attention its importance deserved. White people are said to reflect an attitude conditioned by a greater knowledge of the subject of human sickness—though the educational campaign by which the laity have become acquainted with the ills of the flesh has by no means proved an unmixed blessing—they appear in consequence to have developed an alertness in regard to the state of their health and are inclined to magnify the physical and physiological changes which characterize the life processes of the human organism. The negro on the other hand appears to live at peace with the various organs of his body and his attitude towards all forms of sickness seems to be one of disregard and of the belief that in the end such troubles will tend to right themselves.

In these circumstances it is stated that the great mass of symptoms without any underlying discoverable lesions which bring thousands of patients to the physician suffering from what are termed "functional disorders" serve no such end in the case of the negro, who is thus spared the fear of many diseases because they have never taken definition in his mind. On the other hand the occurrence of what is defined as "organic disease" is higher in the negro than in the white; such misfortunes are also met with in more advanced stages for as a rule they are only disclosed after long periods of progress. Here the negro's disregard of all forms of disease acts to his detriment. It is claimed that if the white man employed the same emotional defences his history of disease would parallel that of the negro, that up to the present no psychogenic origin of the noted differences in disease patterns has been suggested, that despite present difficulties these theories may yet be fully proved, and that the study of disease in the negro will advance rapidly all knowledge of the psychogenic factors of disease as it occurs in the two races.

Attention is called to the fact that the two cultural levels are so entirely different that two taking-off places are provided for the comparative study of the problem, though in course of time this opportunity will be lost since already in certain communities where the two races are inclined to mingle more freely the attitude of the negro towards disease is gradually becoming to resemble that of the white. In the search for a genotypic form of disease in the negro the sum total of his personality must be taken and not merely the physical workings as they are shown in his body, for whatever has been an element of strength in his workaday life remains with him when he takes to his bed through sickness, since sickness is not a separate life into which he enters shutting all doors of his past life behind him.

P. Granville Edge.

DE BOER (H. S.). **Health Propaganda amongst Indigenous Races in the Tropics.**—*Jl. Roy. San. Inst.* 1938. Oct. Vol. 59. No. 4. pp. 286–296.

The author emphasizes that the complex mixture of races, languages and customs which is the rule in tropical countries, adds enormously

to the difficulty of education. An encouraging fact, however, is that the number of educated Natives is constantly increasing, and that, especially in Africa, literature in the Native dialects is avidly sought. He considers that preventive and curative medicine should go hand in hand. The value of the spoken word in health education is greatest when it is used in the form of quiet informal discussion with elders and chiefs who, as a rule, take their responsibilities seriously. Posters, the cinema and magic lantern, broadcasting, models and health shows are discussed and the excellent plan by which, in Uganda, model houses are built and occupied by picked Natives on condition that the occupants take every opportunity to show their friends and acquaintances around, is mentioned. Attention should be paid especially to the education of the young, and in this work the co-operation of Missionaries and members of the Education and Administration Departments is of the greatest value. The work is difficult and often disappointing, and requires tireless attention to follow-up and maintenance, but it is necessary that it should be undertaken.

[It is heartening to know that a worker of long experience in Africa pays to the Natives the deserved tribute of intelligence and responsibility.] *C. W.*

REVIEWS AND NOTICES.

ROME: COMITATO ROMANO PER L'ASSISTENZA ANTIMALARICA. **L'Opera del Comitato Romano per l'Assistenza Antimalarica dal 1921 al 1935.** [The Achievements of the Roman Committee for Anti-Malaria Assistance from 1921 to 1935.]—98 pp. With 47 figs. on 32 plates & 2 folding maps. 1938. Rome: Luigi Proja, Via Emilio Faà di Bruno, 7.

Much has been written in recent years about Italy's outstanding achievement in converting malaria-stricken uncultivated wasteland in the neighbourhood of Rome into productive agricultural areas with flourishing townships and villages inhabited by prosperous and healthy people. That transformation has now been completed and the present report gives a detailed and interesting description of persistent effort crowned with success.

The *Comitato Romano per l'Assistenza Antimalarica* was founded in 1921. Its object was to promote and intensify the prevention and treatment of malaria in the Province of Rome. The return of soldiers after the war with fresh strains of plasmodia had increased the incidence of the disease. In the early years chief attention was given to the distribution of quinine. Subsequently the construction of canals, training of water courses, land reclamation, controlled agriculture, road construction, and the building of hygienic dwellings, were accompanied by the creation of health and social services and the provision of adequate medical care for the population. Two large scale maps and 47 excellent photographs assist the reader to obtain an idea of the transformation that has been effected in so short a time and the magnitude of this excellent example of *bonifica integrale.*

Norman White.

BOTREAU-ROUSSEL [Médecin-Général, Directeur de l'Ecole d'Application du Service de Santé des Troupes Coloniales (Pharo)] with the collaboration of MM. ASSALI, DEJOU, HUARD, MONTAGNÉ, PALES & ROQUES [Chirurgiens des Hôpitaux Coloniaux, Professeurs aggrégés du Pharo]. **Clinique chirurgicale des pays chauds.** [Clinical Surgery in Hot Climates.] Préface du Pr. Ch. LENORMANT.—pp. vi+335. With numerous illustrations. 1938. Paris: Masson et Cie, 120 Boulevard Saint-Germain. [80 fr.]

It is refreshing, if a little chastening, to read the views of experienced clinicians from a different school.

Such is the position of an English reader of this excellent and practical book; for example, emetine was apparently used by Magendie but fell into disuse, to be rediscovered only by Sir Leonard ROGERS in 1912. Again the ravages of the amoeba are widespread, even to urinary amoebiasis, while it is stoutly denied that the *F. bancrofti* plays the rôle of causal agent in elephantiasis attributed to it by Manson and his followers: any connexion between the two, if not imaginary, must be coincidental! Open operation is preferred for liver abscess to aspiration, which is dismissed with scant notice.

Such matter, however, will be considered by readers in the light of personal experience and does not detract from the value of the book for those practising abroad. Excellent is the care with which common

medical diseases are considered regarding their effects, direct and indirect, upon surgery. Operative technique is sound and simple as befits surgery under difficulties, and treatment is well up to date. Illustrations are effective and striking. In addition to covering fully the usual surgical diseases of the tropics, there is a good chapter on staphylococcal infections as manifest in the hot countries, and another on tuberculosis as affecting the African native. *A. L. Gregg.*

MORÉNAS (Léon). **Etude morphologique et biologique sur les flagellés intestinaux parasites des muridés. Etude comparative des flagellés du cobaye.** [Morphological and Biological Study on the Parasitic Intestinal Flagellates of the Muridae.]—Annales de l'Université de Lyon (Médecine) III. No. 1. 234 pp. With 12 text figs., 3 graphs & 12 figs. on 6 plates. [Bibliography.] 1938. Paris: Masson et Cie, 120 Boulevard St.-Germain. [60 *fr.*]

In this monograph the author has reviewed present knowledge of the intestinal flagellates of rats, mice and allied rodents and has compared them with the similar organisms found in guineapigs. The author's own observations are also recorded, the whole subject being dealt with under the headings of morphology and biology. Under the second heading are described the features which influence the flagellate infections, such as the *p*H of intestinal contents, the kind of food eaten by the hosts and the associated bacteria. These considerations have some bearing on the human infections of a similar kind, so that the paper may be of interest to students of the intestinal protozoa of man. *C. M. Wenyon.*

GIMLETTE (John D.) [M.R.C.S, L.R.C.P.]. Edited and Completed by H. W. THOMSON, M.C.S. (retd.). **A Dictionary of Malayan Medicine.** With a Foreword by Sir Malcolm WATSON, M.D., LL.D., Director, Ross Institute of Tropical Hygiene.—pp. xvi+260. With 2 plates. 1939. London: New York: Toronto: Humphrey Milford, Oxford University Press. [7*s.* 6*d.*]

This work, if we are to judge from the introductory remarks of Sir Malcolm Watson who knew the authors well, was truly a πόνος α πόνος, a labour of love, undertaken when Dr. Gimlette had had to retire from active practice owing to illness contracted in the course of his work. A dictionary of Malayan medicine cannot fail to be of inestimable value to medical men going to Malaya to practise, and, dealing as it does with poisons and charm cures, which have been more fully described in another work by the same author, will prove a constant source of interest for those of long residence there to dip into. The Malayan part is very full and complete and the short English-Malay addendum will considerably facilitate reference. The cost is remarkably low. *H. H. S.*

POWER (D'Arcy) Sir [K.B.E., F.R.C.S., Consulting Surgeon to, Archivist and Keeper of the Records at St. Bartholomew's Hospital; Honorary Librarian, Royal College of Surgeons of England]. [Edited by]. **British Medical Societies.**—pp. xvi+312. With 48 plates. 1939. London: The Medical Press and Circular, 8 Henrietta Street, Covent Garden. [10*s.* 6*d.*]

Curiosity, or the desire to learn, is said to have been the main motive for founding many of the medical societies described in this volume.

The book is composed of some 34 papers by various authors collected together, with some additional information, from issues of the *Medical Press and Circular* during the years 1936–38. The papers deal with the early histories and development of some typical British medical societies beginning with the Society of Apothecaries of London founded in 1617, and ending with the Kensington Medical Society founded in 1925. Between these two extremes are given histories of a number of other medical societies in different parts of the Kingdom, in Scotland, Ireland, Wales and the provinces, and in London. To have included all the British Medical Societies would have been a very difficult task, but one wishes that among the medical societies selected for notice in the book there had been some concerned with the newer outlook of preventive medicine, such as, for example, the Society of Medical Officers of Health. Tropical medicine is well represented by the Royal Society of Tropical Medicine and Hygiene, of which Dr. S. H. Daukes gives a succinct and most interesting account.

Sir D'Arcy Power, who has acted as editor, contributes a paper on the Abernethian Society at St. Bartholomew's Hospital, and a short preface in which he outlines the development of the British medical societies from their enthusiastic beginnings as centres for fostering a spirit of good fellowship, community of interest, and advancement of knowledge among medical men, through a middle period of lassitude, up to the present day in which they appear to have settled into a familiar mould designed to provide a common meeting-place, and the means of interchange of professional knowledge.

R. L. S.

MARTINDALE. **The Extra Pharmacopoeia.** Twenty-First Edition, in Two Volumes. Vol. II. pp. xxxvi+1148. 1938. London: The Pharmaceutical Press, 23 Bloomsbury Square, W.C.1. [22*s.* 6*d.*] [Review appears also in *Bulletin of Hygiene.*]

Volume I of this edition of the "Extra Pharmacopoeia" came out on 1st February, 1937, and the complementary volume II, published on 25th November, 1938, completes the 21st edition of a work which first appeared in 1883. This second volume is concerned mainly with matters of diagnosis, with the analysis and assay of medical products, and with numerous other subjects associated with medicine, chemistry and pharmacy not included in the first volume.

Progress of research has made it necessary to introduce substantial additions in many sections, and to subject the information contained in the previous edition to a critical revision. For instance, in the part dealing with the analytical addenda to chemicals and materia medica described in volume I, details are included of the new standards required by the 1936 Addendum to the *British Pharmacopoeia*, the 11th decennial revision of the *United States Pharmacopoeia* which became official on 1st June, 1936, and the new *French Pharmacopoeia* published early in 1938. To the data on chemistry and chemical pathology a new and most useful section is added on "Chemical Nomenclature" to assist readers to an understanding of the structure of the organic compounds used in medicine. In the bacteriological and clinical notes information is incorporated on several diseases not hitherto dealt with in this section; these include Bejel, Chagas's Disease (spelled Chaga's Disease in error), Chancroid, Cholera, Guinea-worm Disease, Japanese River fever, Lymphogranuloma Inguinale, Pink Disease, Schistosomiasis, Tropical Ulcer, and Tularaemia.

Other sections on tests and microscopic methods, on dietetics and foods, on sterilization, disinfection and chemotherapy, X-rays, radium and electrotherapy give much varied and useful information. It is not possible to indicate here all the ground covered, though it may be truly said that the reputation of the "Extra Pharmacopoeia" as an almost indispensable source of quick and accurate information is fully maintained by this volume. *R. L. S.*

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